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Contents

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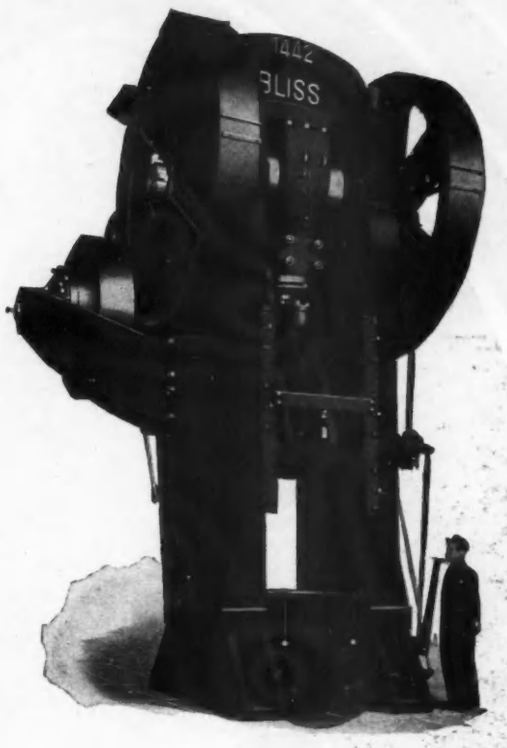

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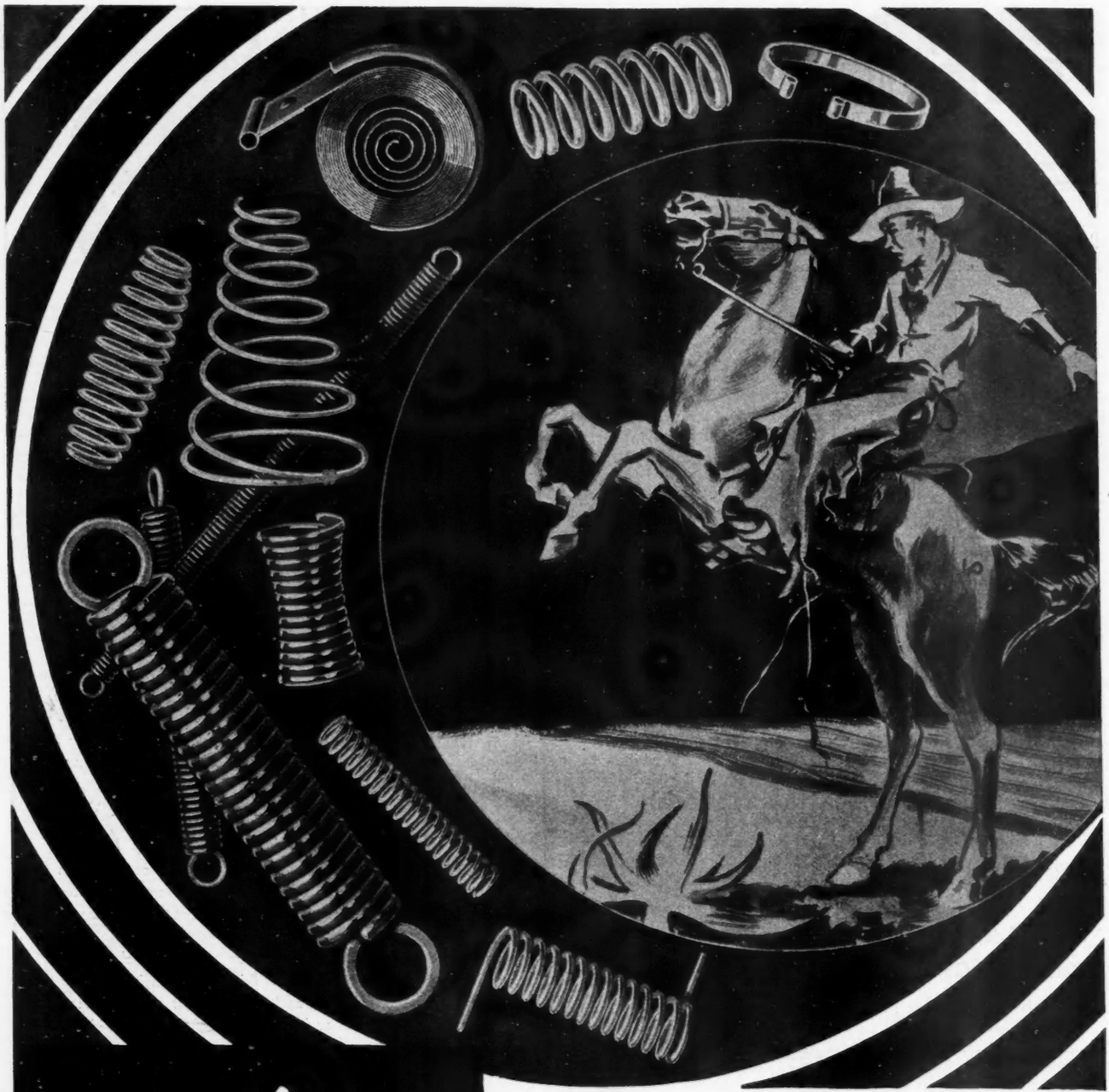

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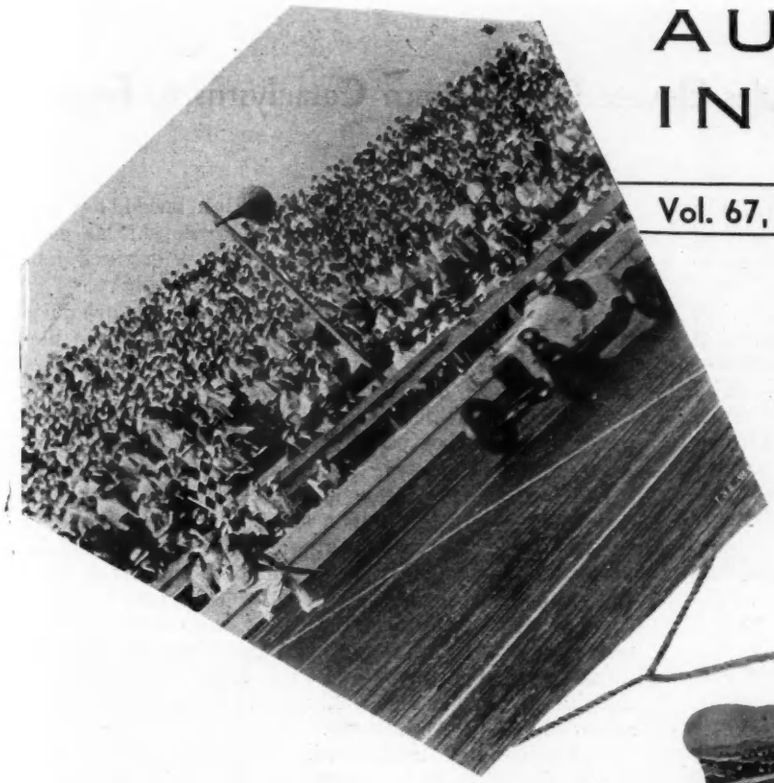
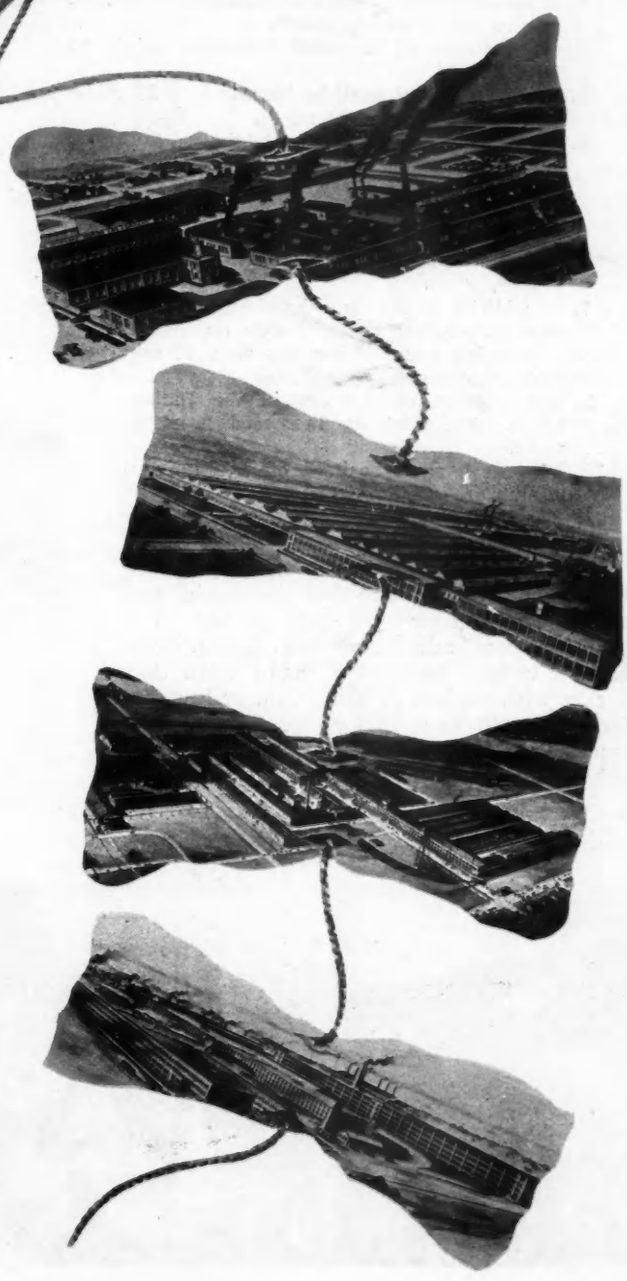


by W. K. Toboldt



Race Rule Changes Will Spur Factory Interest In Classic

Proposed Modifications May Bring Car Companies Back to Racing Where Manufacturers Once Held Principal Role

SOME real changes are being made in the rules for the 1933 Indianapolis Race. Semi-stock cars, which have been forging to the front as competitors in the speed classic, will be further encouraged by the current revisions.

When D. G. Roos, Studebaker chief engineer, urged that gasoline and oil consumption be limited in future races, writing in the June 11 issue of *Automotive Industries*, he seems to have started something. At least the joint meeting in Detroit of factory engineers, racing officials and officers of the Indianapolis Motor

Will New Racing Rules Elevate Racing From Cataclysms to Engineering

Speedway which discussed changes in the rules a month ago, centered much of its attention around these and other points raised in the Roos pronouncement.

Many phases of racing were brought up at that meeting but the main arguments centered around a reduction in weight per cubic inch of piston displacement and limiting oil and fuel consumption. The former is designed further to encourage entry of semi-stock cars and the latter to encourage more careful design, improve workmanship and promote safety.

The proposed changes in the rules which grew out of this meeting, and which seem certain of final adoption for next year's race, include:

1. A reduction of the weight requirement to 7 lb. per cu. in. of displacement.
2. An increase of the final minimum weight to 1950 lb.
3. Qualifying trial shall be increased to 25 miles at a minimum of 100 m.p.h.
4. Capacity of fuel tanks shall be limited to 15 gal. the capacity of any reserve tank being included.
5. Total lubricating oil supply shall be limited to 6 gal. (24 qt.) for the entire race.
6. Tread widths from 52 to 65 in. shall be permitted.
7. In addition to the usual hand crank, a mechanical starting device will be required.
8. A steering angle of not less than 20 deg. will be required.
9. The number of starters in the Indianapolis race shall be increased from 40 to 42.
10. Fire dash shall be built of 3/16-in. aluminum or 1/16-in. steel.
11. Any type of supercharger will be permitted on two cycle engines.

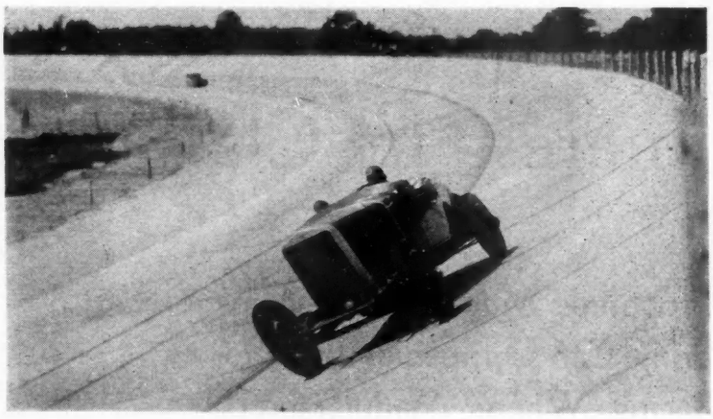
Even a cursory glance at these proposed amendments will indicate that the special racing creation will have its work cut out for it during the next Indianapolis race. Boiled down, the new weight restriction would mean that all cars with engines of 275 cu. in. or less displacement will have to add weight so as to come up to the 1950 lb. minimum. Above that displacement, the 7 lb. per cu. in. clauses will apply. In other words, the high speed, low displacement engines will have to add weight, as compared to last year, while the semi-stock engined jobs will be permitted to remove some excess weight.

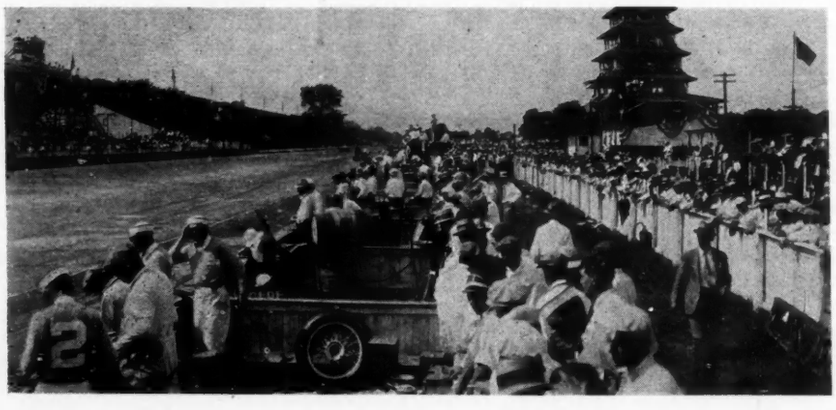
However, it must be remembered that there are quite a few special racing engines of relatively large displacement. For instance, the Miller engines used in the four-wheel drive race cars have a displacement of 308 cu. in. which is greater than some of the engines used in stock passenger cars.

It will be interesting to know just how much metal can be removed from the semi-stock cars without using special chassis and doing a lot of machine work. At the present stage it would appear to be rather difficult, particularly when one studies the specifications of 1932 Indianapolis race cars which show that nearly all of them were from 50 to 100 lb. over the required minimum. However, in the case of the Hudson car with its 254 cu. in. engine, weight will have to be added to the chassis used in the 1932 race to bring it up to the required 1950 lb. minimum.

The advantage undoubtedly lies with the engines whose displacement is nearest to 279 cu. in. as that is the greatest displacement which permits the 1950 lb. minimum weight for the vehicle.

This reduction will be a great advantage to those



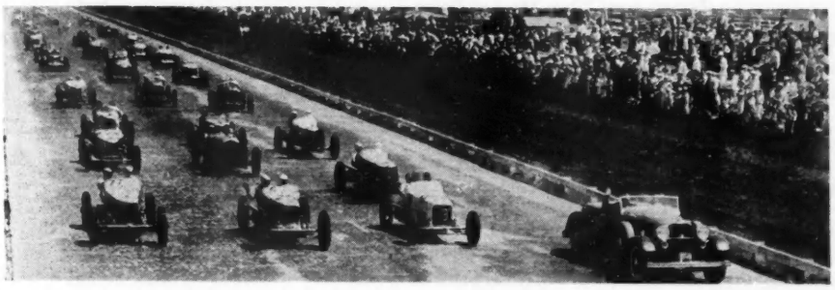


" . . . suggestions covering steering angle and fire walls are safety items . . . "

Left: " . . . limiting fuel tanks to 15 gal. will increase number of pit stops from one to three . . . "

Laboratories?

" . . . . . oil spilt on track has resulted in accidents . . . . . "



" . . . the use of self-starters should save a lot of wear and tear on drivers' nerves . . . "

The start of the 1932 Indianapolis Sweepstakes, paced by Edsel Ford

drivers using large displacement engines who can take advantage of it. For, in addition to a better weight-displacement ratio, the reduction will be reflected in improved handling and better tire life. As an example, Snowberger had to add considerable weight to his Hupmobile chassis to bring it up to the 2740 lb. required for his 366 cu. in. engine. To carry this weight and get acceptable tire mileage he had to resort to 7-in. tires which in turn produced very hard steering and reduced speed. The new ruling would permit him to remove nearly 200 lb. of excess weight which would in turn improve tire mileage and possibly a reduction in section.

W. D. Edenburn made the suggestion regarding the increase in the qualifying trial from 10 miles to 25 miles. This undoubtedly will be discussed at great length by the drivers and if adopted will cause the mechanics to devote even greater care in the preparation of the cars. In addition it will tend to eliminate those cars which normally fall by the wayside in the early stages of the race. In other words, there will be more cars on the track for a greater portion of the race and consequently more interest for the spectators.

Limiting the amount of oil to 24 qt. is probably the result of the suggestion made by D. G. Roos in the article previously referred to. This will not be a hardship on any of the contestants, provided of course, that the oil is not lost by leakage. And that is one of the primary reasons for the ruling, inasmuch as oil spilled on the track has resulted in bad skids and occasionally accidents. Mechanics will therefore have to pay more attention to the proper fitting of pistons, rings, bearings and the installation of gaskets, oil lines, and oil line connections. Just how this ruling will be enforced was not brought up at the meeting. However, it will probably be necessary to supervise the initial filling of the cars and subsequently careful attention by the technical committee during the progress of the race.

Naturally the direct effect of limiting the fuel tank capacity to 15 gal. is to increase the number of pit stops from one to three. But, as pointed out in the discussion of this ruling, it should result in improved handling of the car as there is not so much variation in weight between the car with a full tank and when it is empty. Undoubtedly some accidents have been caused by tired drivers, who, having gotten used to the "feel" of the car with an empty fuel tank, are unable to adapt themselves to altered characteristics of the car after the fuel supply is replenished.

The proposed ruling permitting any tread width from 52 to 65 inches will permit many more factories to enter current production cars and in addition, the private owners will have a wider selection of axles and chassis from which to choose. The Cord front drive, for example, is barred under the present rules, but, if the suggested revisions are accepted, it would be permitted to enter. However, as one of the drivers points out, increasing the width of the tread also in-

creases the weight and wind resistance and also the difficulty in handling the car during the heavy traffic in the early stages of the race.

The suggestions covering the steering angle and fire walls are of course safety items. In the past, there have been some cars which had sufficient steering angle to negotiate the turns, but not enough to enable the driver to pull it out of a severe skid.

The use of a self-starter should save a lot of wear and tear on the driver's nerves, not to mention their backs when their cars refuse to fire at the starting line or at the pits during the race. In the past Phil Shafer had his Buick so equipped, the connection being carried to a socket type terminal in the side of the frame. The battery was kept at the pits and when it was desired to crank the engine the battery was plugged into the fitting on the chassis.

Some years ago, the field was limited to 33 cars, more recently it was increased to 40 and if the proposal is accepted, there will be 42 cars to face the starter. This would make 14 rows of three cars each and while the greater number of cars will increase traffic congestion at the turns at the beginning of the race, it is not believed that it will increase the hazards of the race appreciably.

Naturally car factories and race drivers are studying the proposed rules with considerable interest and in most quarters it is expected that they will be adopted with only slight alterations.

Weight of 1932 Indianapolis Cars

Driver	Car	Make Engine	1932 Required Weight	1932 Actual Weight	1933 Req. Weight	Displace. cu. in.
Frame	Miller-Hartz Spe.	Miller	1750	1768	1950	182
Wilcox	Lion Head Spe.	Miller	1750	1780	1950	220
Bergere	Studebaksr Spe.	Studebaker	2530	2575	2360	337
Carey	Meyer Spe.	Miller	1870	1870	1950	249
Snowberger	Hupp Comet	Hupp	2740	2741	2560	366
Z. Meyers	Studebaker Spe.	Studebaker	2530	2555	2360	337
Hall	Duesenberg Spe.	Duesenberg	1820	2108	1950	243
Winnai	Foreman Axle Shaft Spe.	Duesenberg	1750	1785	1950	150
Winn	Duesenberg Spe.	Duesenberg	1750	1754	1950	150
Huff	Highway Parts Spe.	Miller	1750	2299	1950	182
Shafer	Shafer Eight	Buick	2130	2236	1985	284
Pettelo	Jones-Miller Spe.	Miller	1750	1956	1950	194
Gulotta	Studebaker Spe.	Studebaker	2530	2590	2360	337
Stubblefield	Gilmore Spe.	Miller	1750	1915	1950	220
Arnold	Miller-Hartz Spe.	Miller	1750	1751	1950	147
Gordon	Lion Tamer Spe.	Miller	1750	1752	1950	220
Gaudino	Golden Seal Spe.	Chrysler	2690	2701	2500	358
Litz	Bowes Seal Fast Spe.	Duesenberg	1750	1830	1950	151
Miller	Hudson Spe.	Hudson	1905	1942	1950	254
Fox	Richards Spe.	Studebaker	2530	2640	2360	337
Schneider	Bowes Seal Fast Spe.	Miller	1750	1778	1950	151
Tripplett	Floating Power Spe.	Miller	1750	1786	1950	220
Campbell	Folly Farm Spe.	Graham-Paige	1835	2362	1950	245
Russo	Art Rose Spe.	Duesenberg	1965	2345	1950	261
Moore	Boyle Valve Prod.	Miller	2010	2151	1950	268
Bost	Empire State Spe.	Miller	1750	1900	1950	215
Crawford	Boyle Valve Prod.	Duesenberg	1750	1766	1950	137
Krieger	Consumers Petro. Spe.	Duesenberg	1750	1769	1950	137
Aspen	Brady-Nardi Spe.	Studebaker	2530	2536	2360	337
L. Meyer	Sampson Spe.	Sampson	1750	2006	1950	201
Cummings	Bowes Seal Fast Spe.	Miller	1750	1792	1950	151
Shaw	Miller Spe.	Miller	1750	2022	1950	230
Saulpaugh	Miller Spe.	Miller	2280	2282	2120	303
Kreis	Studebaker Spe.	Studebaker	2530	2556	2360	337
Schrader	Miller F.W.D.	Miller	2310	2330	2150	308
McKenzie	Brady Spe.	Studebaker	2530	2638	2360	337
Brisko	Brisko-Atkinson Spe.	Miller	1750	1830	1950	151

Temperature Influence Upon Rubber During Vulcanization

WHEN raw rubber is heated with sulfur it undergoes a marked change in properties and forms what is commonly known as vulcanized rubber.

The amount of sulfur combined with the rubber may range from a fraction of 1 per cent to about 32 per cent. The products containing the lower percentages of sulfur are soft and occur in familiar articles, such as automobile tires and many household rubber goods. The ordinary hard rubber is an example of a compound containing the higher percentages of sulfur.

Vulcanized rubber is used commercially in many articles, such as gaskets, steam hose, and brake lining, which are subjected to relatively high temperatures. When vulcanized rubber is heated, it gives rise to an unpleasant odor which becomes more intense and more disagreeable the higher the temperature. The odor is due in large part to sulfur compounds which are derived from the sulfur that was used to vulcanize the rubber. This loss of sulfur is accompanied, in general, by deterioration in the electrical and mechanical properties of the rubber.

A study has been made at the bureau to ascertain the extent to which rubber of various compositions decomposes on heating. The purpose of the investigation was to determine to what temperature and for what length of time vulcanized rubber could be heated without producing a serious change in the composition. In this study measurements were made of the principal product of decomposition—hydrogen sulphide.

Below the temperature of boiling water the rate of decomposition was so slow that no significant portion of the sulfur content was lost. As the temperature was increased, however, the rate of evolution of hydrogen sulphide increased rapidly.

The results of this investigation afford fundamental data from which it is possible to determine how much a sample of rubber will decompose when the composition of the rubber and the time and temperature are given.

Measurements were not made on the change in strength, or other physical properties, although qualitative observations in this regard were recorded. For a complete account of the work, Research Paper No. 464, which was published in the *Bureau of Standards Journal of Research* for August, should be consulted.

JUST AMONG OURSELVES

Amelia Earhart At S.A.E. Dinner

WE saw and heard Amelia Earhart at the S.A.E. Aeronautical Dinner in Cleveland last week; and just as everyone else has been, we were tremendously impressed by her charm, her sincerity, her *honest* modesty and her interesting talk.

If you have never heard her speak, don't miss the next chance you get to do so. You will be well repaid.

She talked, among other things, about some wishes which had come to her while on her trans-Atlantic and transcontinental flights. On the former she wished for something which would remove ice from the wings, for an instrument which would record height above ground and for better weather reporting. On this flight she carried no parachute and had a most comfortable ride.

On her transcontinental flight she did carry a parachute and wished that someone would make a parachute that was comfortable to ride with.

——And along with the rest of the audience, we wished that she had talked longer about her wishes.

Senator Bingham Wants Speed Records

SENATOR HIRAM BINGHAM says that we just will have to produce an engine which will enable us to beat Great Britain's airplane speed record of something over 400 m.p.h.

He was quite emphatic about this when he talked at the S.A.E. Aeronautical Dinner the other night. He mentioned with chagrin the fact that all land, air and water speed records now are held abroad. He really seemed quite upset about the matter.

We still wonder why this matter of speed records is something to be upset about from a national standpoint.

Many of our readers agree with Senator Bingham, we know. We hope to get the Senator to amplify his reasoning on this matter of speed records in an article for *Automotive Industries* near the end of this year.

He didn't promise to do so, but he almost did—and we're surely going to follow up.

"High-Pressuring" Low-Pressure Tires

SOME tire company men, even sales department representatives, are beginning to feel that it might be possible to go far too fast in regard to very low-pressure, very large-section tires.

The public at large still is "sold" on the new tires, it seems, but those who have put them on old cars have been causing the tire stations some worry in comeback kicks. Sales of the biggest sizes have not come up to expectations in several instances.

That's only half the story, of course, because many people who don't want replacement tires are fully sold on getting them on their next new car as original equipment—"designed into the car."

Nevertheless, the same thing may happen there later if too large sections and too low pressures are insisted upon by sales departments.

The industry will do well to content itself with one, two or three oversizes for next year; at least the tire as well as the car engineers still think so, and, after all, they are the fellows who have to do this "designing into the car."

Injured Civic Pride Healed With Chisel

HERE'S one we heard in Cleveland last week:

Cleveland is just completing a new and imposing bridge across the Cuyahoga River. Large upright, yet Sphinx-like figures adorn several pylons, each holding in its hands a motor truck symbolizing the spirit of transportation—or what have you. So far so good.

But (sad commentary on Cleveland's care for her civic pride), after the figures were finished, a close looker discovered that the truck had been modeled unmistakably from a vehicle produced by a large truck company having plants in New York, Allentown, Plainfield and points East!

Civic righteousness arose magnificently, however, the story goes and belated justice is being done to Cleveland's big truck maker. The design is to be rechiseled, we understand, so that Cleveland's posterity will look upon a Cleveland product in the hands of its symbolic bridge figures.

So endeth the tale as it was told to us by a famous automotive soothsayer of that fair city. Selah!—N.G.S.

Air Conditioning Seen as E

by Joseph G

"IF the railroads continue to add air-conditioning equipment, motor coach operators may be forced to follow suit if they expect to retain their hold on long-distance passenger service. Don't be surprised to see at least one bus builder demonstrating an experimental job before the end of the summer."

Prophetic or not, we are quoting from a conversation with a man whose name is well known to automotive engineers.

Furthermore, it is more than likely that air-conditioning will be one of the liveliest topics for discussion at the annual meeting of the National Assn. of Motor Bus Operators in Chicago next month.

Funny how an idea sprouts. Certain engineers have had air-conditioning on their mind for years but couldn't do anything about it because no one had the answer. Came cheap iceless refrigeration for the home; then air-conditioned cars on the railroads, and now the new motored railcars. Someone may bridge the gap to the bus.

As the railroads gather momentum in educating the public to comfort isn't it likely that the bus-riding section of it will also demand a taste of luxury? And even be willing to pay a little extra for it. However, if the fare isn't boosted, surely the operator can benefit by better loading—by a jump in passenger miles.

Of course we all realize that air-conditioning for automotive purposes is quite a nebulous proposition. No one knows much about it—no one has a specific plan to offer at the moment. But behind the scenes many master minds are at work. In fact we have been in a huddle with some and may spring some of their ideas very soon.

While we pause before going into some of the technicalities of the problem on the floor, it is well to look at the seamy side, which is bound to exert a profound effect upon the thinking of anyone working on air-conditioning. Legislation is the fly in the ointment. Here is one place where a thing like weight is even more important than initial cost. Operators are afraid that any additional machinery or attachments will encroach on the weight limitations imposed by the outgoing and likely to be imposed by incoming legislatures. So in addition to other handicaps the designer is faced with one of whittling down the weight of the new stuff. But this needn't be an insurmountable hurdle because there must be possibilities of paring weight in other places such as the body, chassis, and engine through the use of lighter alloys as well as thoughtful redesign.

Getting down to brass tacks, what is involved in air-conditioning for automotive vehicles? We think the term "partial air-conditioning" coined by one of the men with whom we discussed the matter recently fits the situation perfectly. What is needed is a simple arrangement that will maintain a "comfort zone" under all outside atmospheric conditions. Students of the problem agree that the first requisite is clean air—not necessarily water-scrubbed, humidified or dehumidified. Humidity just about takes care of itself.

The other requirements are: adequate heating in winter and cooling in hot weather. Heating may be the same as at present except that the temperature must be controllable by an adjustable thermostat. But if Diesel engines come in, some auxiliary form of

Boon to Motor Coach Travel

Geschelin

heat such as a stored gas burner may have to be provided, because the Diesel converts most of the fuel into useful work and leaves only a slender bit of energy in the water jackets and exhaust manifold.

Cooling is the real problem. And from a purely speculative point of view several logical methods of attack are possible. These lie in mechanical refrigeration and the use of a renewable source of potential energy such as dry-ice, or water-ice. Both present serious problems which will require considerable research. The first entails the use of a power take-off from the transmission or a small auxiliary engine. Either arrangement involves complications due to space, weight, accessories, and cost requirements.

Dry-ice or water-ice cooling may offer a satisfactory solution provided the equipment is not too bulky. One guess is that mechanical equipment will be higher in first cost, but a good deal cheaper to operate.

Air-conditioning, if adopted, will bring about some important changes in design, the bulk of which will be reflected in body construction. Adequate insulation is the first requirement. This is answered by thermal insulation of side-walls, floor, and ceiling. It also demands well insulated windows and doors. Whether or not stationary window sash is to be used is a moot question depending upon regulation and the requirements of safety. If the sash may be fixed as on the Budd railcar, body construction can be lighter, which is important, perhaps cheaper, and the glass area may be somewhat reduced.

Temperature range is an open question. Naturally it is dictated by human comfort and something may be gained by studying the experience of railroads to date. According to an authoritative study (1) during hot weather the inside temperature should be 10 to 15 deg. Fahr. below the outside. Other people think that 7 deg. difference is sufficient.

At any rate there are two limiting extremes, a maximum of about 80 deg. Fahr. so as to get below the sweating point, 83 deg. Fahr., and a good minimum around 68 deg. Fahr. for winter running.

It seems that the effectiveness as well as the most economical size of the air-conditioning apparatus depends upon three factors:

1. Temperature range.
2. Effectiveness of insulation.
3. Degree of infiltration of fresh air.

The latter is perhaps the most troublesome question. Opinions are sharply divided between those who think that air should be changed many times each hour and others who say the ideal condition is no change at all. Something in between these limits is evidently a good compromise.

Railroad practice at present is about 25 per cent fresh air. Whether this is good for buses will depend upon actual trial and error experiment. This much is certain, that unless the atmosphere is clean and fresh there is no point to air-conditioning. So the designer must seek some acceptable compromise between comfort and the size of the equipment required to produce it.

(1) Air Condition and the Comfort of Workers. Industrial health series, No. 5. Published by the Metropolitan Life Insurance Co.

When it comes to laying out the details of an air-conditioning unit, it is suggested by one organization that the simplest plan is to treat heating and cooling separately. Thus we would have a separate cooling system with ducts at the ceiling where they belong; and a heating system with ducts along the floor. Both systems would be thermostatically controlled by some suitable regulator.

This arrangement could incorporate a single ventilating system consisting of a circulating fan, an exhaust fan and duct, a filter for cleaning the air, and a controlled fresh air intake damper. Humidity is automatically adjusted by the condensation of vapor on the cooling unit.

By recirculating the air at a constant rate, the atmosphere in the passenger compartment may be held under a positive pressure, which has some important advantages. For one thing it reduces the infiltration of noxious fumes from the engine compartment and exhaust manifold, thus automatically eliminating one serious source of air pollution. Then by arranging an exhaust fan at the rear just active enough to keep the atmosphere clear, the pressure may be employed to operate a balanced damper which would admit only enough fresh air to replace the deficiency due to exhaust.

Too, there is a possibility of eliminating exhaust fans entirely by locating vents at the regions of suction around the body. One exists at the rear; another at the front, back of the driver's compartment. If this is found practical, the accessory equipment would be greatly simplified since both intake and exhaust would operate automatically. Then the only fan needed would be the one employed for stirring up the atmosphere.

This rather sketchy outline has skimmed over the requirements of what might be termed a "partial air-conditioning" system for buses. Those interested in further refinements are referred to a discussion on the requirements of an air-conditioning system for the home which was published recently (2). Some compromise may suit the most critical.

Needless to say, we are dealing with something new —something untried. It is still in the experimental stage even on the railroads where mechanical limitations aren't nearly as serious. Nevertheless, several important manufacturers in the air-conditioning industry have interested themselves in the automotive problem and are working along some rather tangible lines.

Which should be well worth their while since there is a potential field for at least $5,000,000 of new equipment if we figure roughly 5000 to 7500 buses in service on long-distance schedules.

At the moment, we are in touch with a number of manufacturers who expect to take the initiative in this promising development. Some time in the very near future hope to publish the results of their preliminary study which should be of real interest to those identified with bus design and operation.

(2) Year Around Air-Conditioning, by W. D. Jordan, president, Air Control Systems, Inc., Case Alumnus, April, 1932.

Attachment for Turning Large Spherical Surfaces

WHEN constructing machinery or tools it is often necessary to produce a small portion of a spherical surface of which the radius of curvature is large.

For example, in the production of optical surfaces on lenses, grinding tools are often from 5 to 20 inches in diameter and faced by surfaces of which the radii of curvature may be as great as 10 or 20 ft. For more moderate values of the radius of curvature such surfaces are easily produced on a lathe by a tool carried on the end of a radius rod, but for the larger values this method is inconvenient or impracticable.

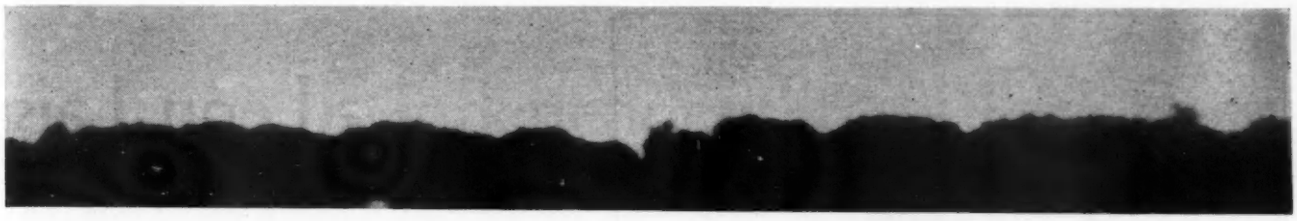
There is a method by which such surfaces can be milled, but this requires a special machine of heavy and very expensive construction which is not ordinarily available.

With this method a separate template is necessary for each required radius, and the method, therefore, is satisfactory only when a large number of surfaces having the same radius of curvature are desired.

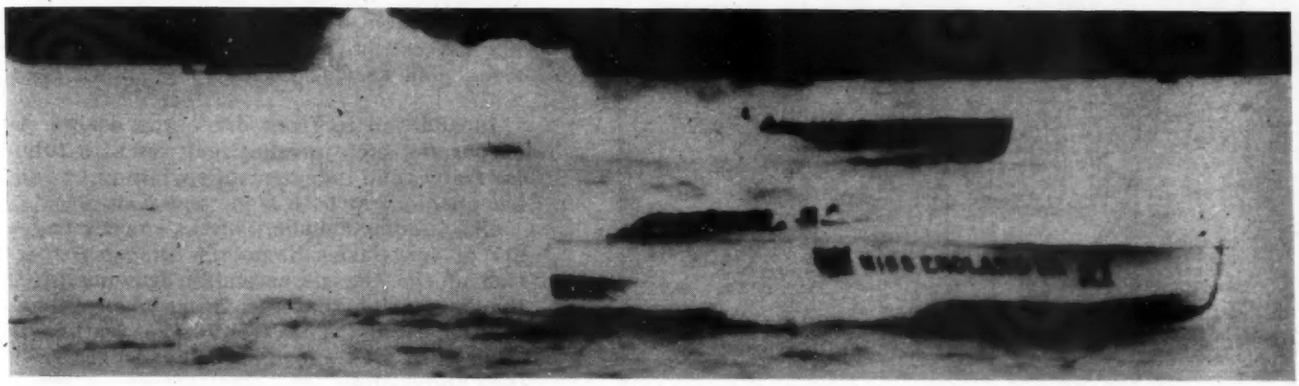
A new attachment has now been constructed at the bureau for producing these curved surfaces. It is relatively inexpensive and is substituted for the compound slide rest on a lathe. A special linkage guides the tool in such a manner as to generate an approximately spherical surface.

By a simple adjustment the linkage can be set to produce either a convex or a concave surface with any desired radius of curvature greater than a certain minimum value which is approximately 20 in. for the attachment which has been constructed. The approximation to a spherical surface becomes better as either the curvature or diameter of the surface is decreased.

A surface of 8 in. in diameter with a radius of curvature of 40 in. is produced with a departure from a spherical surface which is less than 0.001 in. If the radius of curvature is decreased to 20 in. and the diameter of the surface is 12 inches, the departure is approximately 0.01 in.—*Bureau of Standards Journal of Research*, Aug. 24.



Gar Wood Retains Harmsworth Trophy



Miss England III, British challenger, fails to complete run, giving Miss America X easy win in Detroit River for British International speedboat classic

DETROIT, Sept. 5—*(Special)*

GAR WOOD drove his Miss America X for an average of 69.036 m.p.h. to a second victory today over Kaye Don and Lord Wakefield of Hythe's Miss England III, but only after the British boat's motors had balked in the very first of the thirty-five miles, and stopped completely at the end of thirteen and one-quarter miles.

Wood circled around the oval seven-mile course alone to retain the British International (Harmsworth) Trophy, but very unsatisfactorily to himself as well as to a holiday audience of around 250,000.

There was a race for a few seconds, first Miss England in the lead, then Miss America, again the British boat and then—the defender.

No one knows—not even Don—what happened to his craft. After she had speeded ahead at the start, the starboard of Miss England's two motors, the one that went out of the running in the first race, stopped. Nothing outward was the trouble with it. Don could not get it going again.

Dick Garner, his mechanic, climbed back in the engine pit with the boat going on one engine and lunging on.

Don drove the boat one lap, and to within three-quarters of a mile of another, when the port engine stopped. Miss England came to a standstill. Don and Garner worked frantically for twenty minutes, endeavoring to get her going. Wood completed the course.

After being towed ashore Don ordered his boat hoisted out of water, and the motors carefully disassembled, that every detail of their condition might be observed in the hope of ascertaining just why they failed.

Don plans to take Miss England to Toronto to make an exhibition run there. Wood may take Miss America to Algonac, Mich.; up the St. Claire River, in a week or so, or to Miami, Fla., the coming winter in an endeavor to better Don's and Miss England's mile straightaway world record of 119.81 miles an hour, a speed not even approached in the two races here.

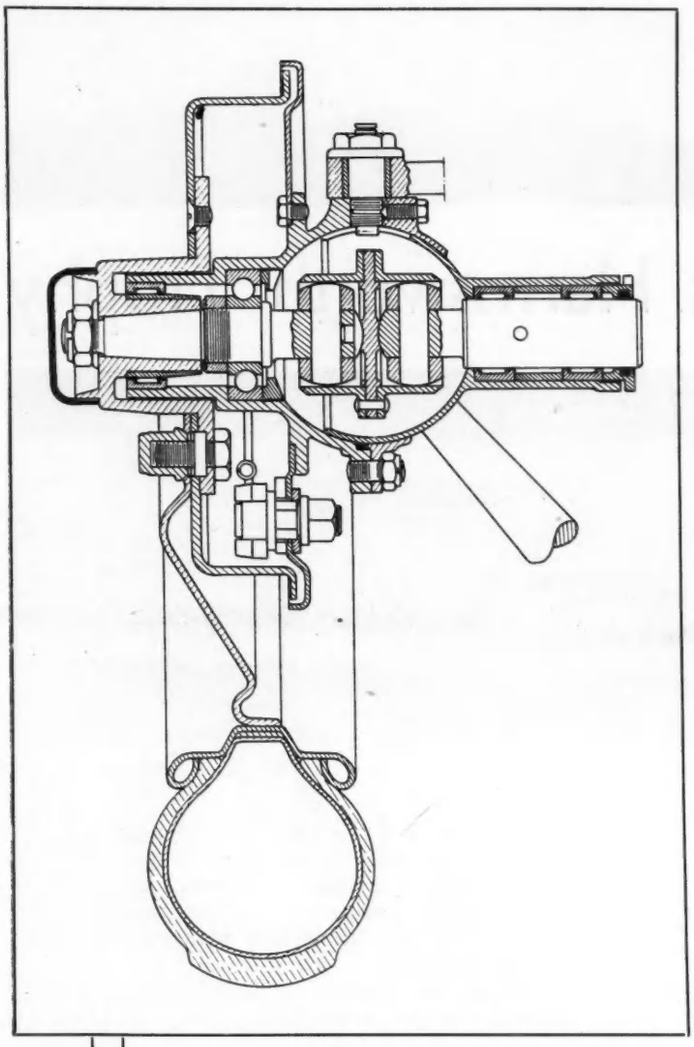
Details concerning Miss England III, which was built by J. I. Thornycroft & Co., Ltd., on an island on the Thames, were closely guarded by workmen until the craft was completed. She measured thirty-five feet in length and has a beam of 9½ feet. In the construction of the hull two skins of mahogany were used with oiled fabric between. The inner skin is diagonal and the other fore and aft. A third skin forming the step is built up into the hull from the bow. As in the case of Miss England II, a forward rudder has been fitted. Some idea of the accuracy of the work may be gained from the fact that the weight of the hull was within forty pounds of the estimated weight.

Unlike No. II of her line, the new boat has fitted twin propellers. Miss England II relied upon a comparatively small propeller that turned 12,000 revolutions a minute with the result that when turning at high speed the craft skidded like an automobile on a slippery road.

Don will have a throttle control which will enable him, when turning,

(Turn to page 348, please)

Leon Laisne F



Front axle-end, steering knuckle and front wheel in section

CARS of rather unorthodox design have been marketed in France for a good many years by the firm of Leon Laisne of Nantes. One of the latest models of this firm is a front-drive chassis of either 8 or 10 hp. tax rating, of which a number of sectional and assembly views are shown herewith.

In addition to front drive, the design incorporates such unusual features as a tubular frame, and independent springing on rubber cushions at both front and rear.

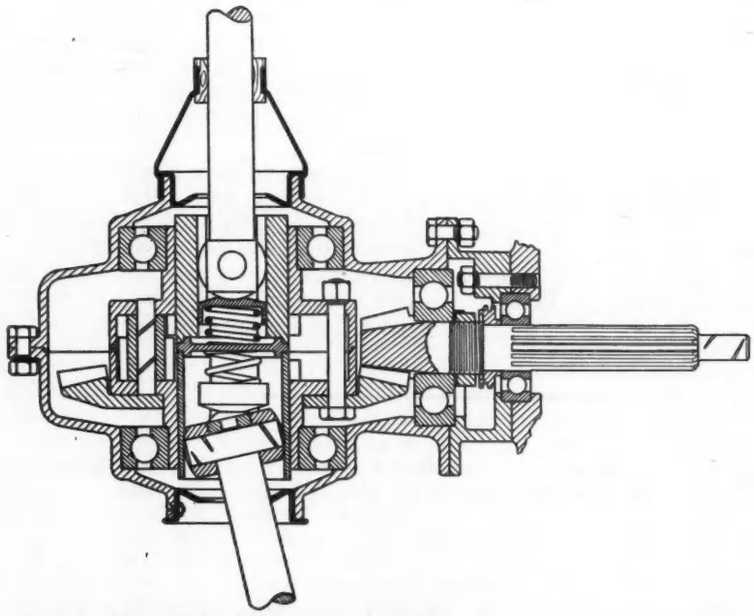
The tubular members of the chassis frame are of very large diameters, and an inspection of the chassis assembly drawing gives the impression that the frame must be unusually rigid. The front-drive feature is claimed to give undeniable advantages from the standpoints of road-holding qualities and efficiency of power transmission.

The frame, as already mentioned, is tubular, the tubular side members being connected by cross members of the same type, the whole forming a very rigid assembly.

Suspension is independent for each wheel, by means of a cranked lever mounted in taper roller bearings in a cage or bearing housing integral with the frame. The two arms of the cranked lever have a length ratio of 4 to 1, and the short arm presses through the intermediary of a rod and a disk on a rubber block which forms the elastic member of the suspension. This rubber block is contained within a closed housing at the extreme forward end of the chassis side member.

It is claimed that the rubber cushion does not wear, as it is not subjected to friction and is completely protected from all atmospheric influences. Moreover, owing to the leverage of the cranked lever, a slight compression of the rubber permits of considerable play of the chassis, so that a very soft suspension is obtained.

Front-wheel drive was adopted by reason of the various advantages offered by it. The entire powerplant being located at the front, the rear end of the frame is free from all mechanical parts; the driving axle is much more accessible and the



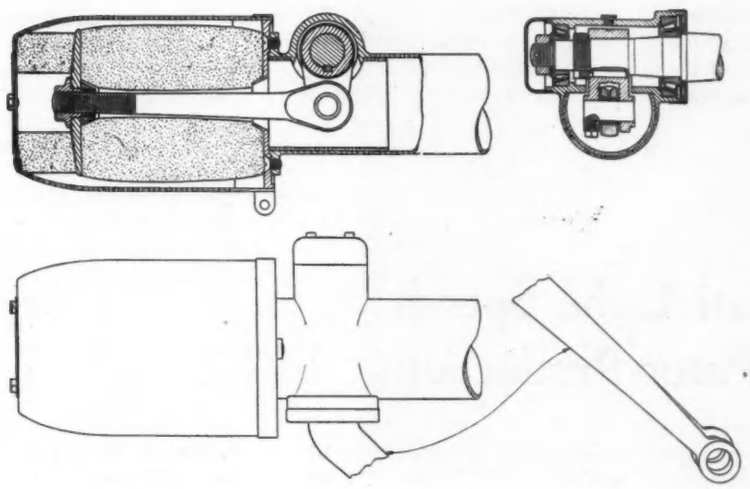
Section through final drive gear housing, showing bevel-gear drive and spur-type differential gear

Front-Drive is Independently Sprung

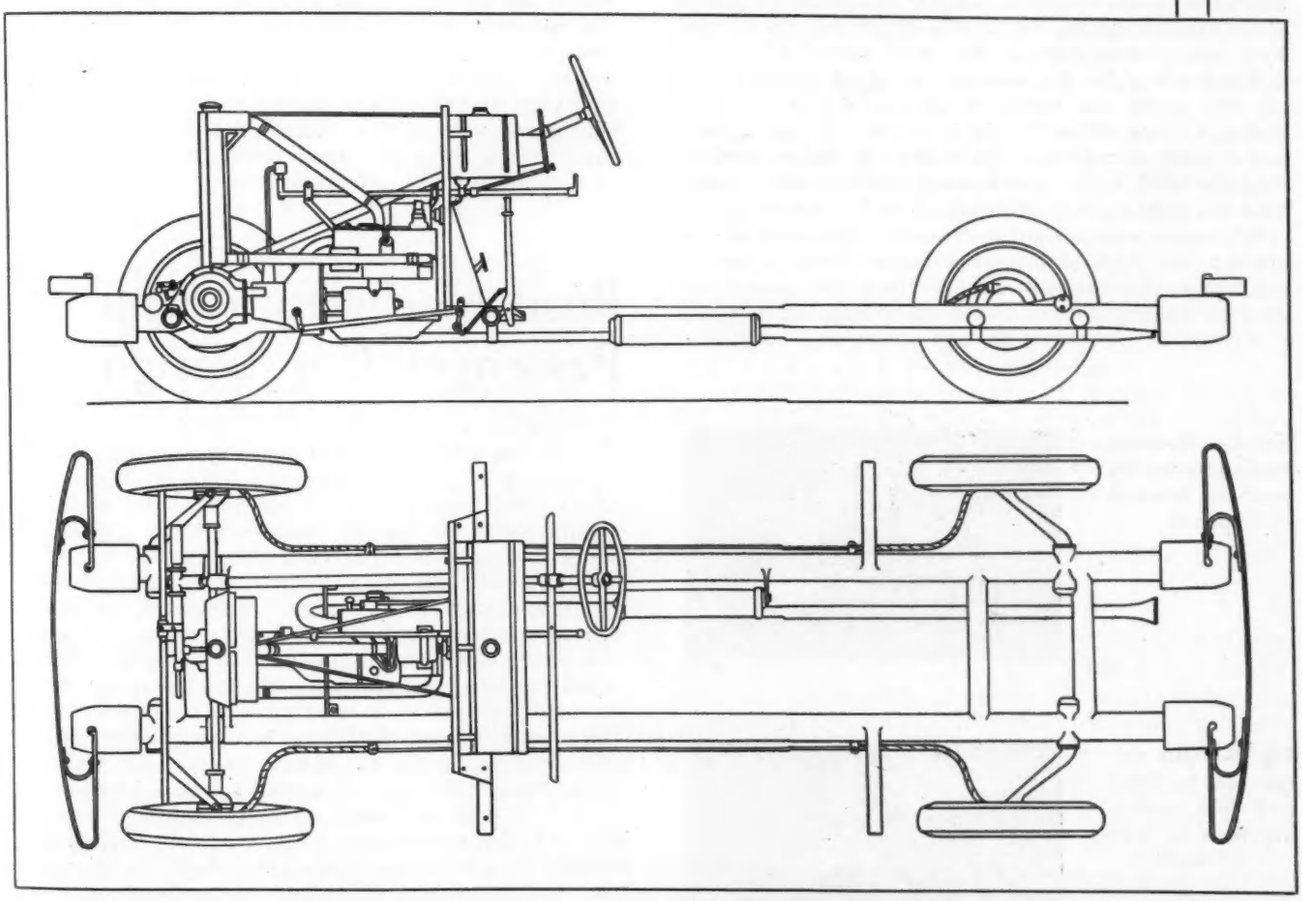
jointed propeller shaft is eliminated.

The power of the engine is always applied to the front wheels in the direction in which they are moving, whereas in a rear-drive vehicle the propulsive effort applied to the front wheels is not in the direction in which they are headed and only a component of the force is effective. In addition to this effective component, there is a lateral component resulting in end thrust on the front-wheel bearing and in a loss of efficiency.

In the chassis under discussion, the final-drive



Front suspension assembly



Leon Laisne front-drive chassis in plan and elevation

housing is rigidly bolted to the transmission housing. From the differential gear the power is transmitted through drive shafts extending from the housing and incorporating double universal joints enclosed in spherical housings at the wheels which permit both steering and up and down motion of the steering spindle and wheels. The universal joints are always well lubricated and completely protected from dust.

Gear changes are effected by means of a sliding rod extending through the dash and capable of motion in the direction of its axis. It is provided with a handle and can be easily operated by the driver.

The steering mechanism is at the forward end of the chassis frame and comprises a pinion and rack, the latter operating the steering wheels through a two-part tie rod. The ends of the tie rods are brought as close as possible to the fulcra of the suspension levers, which eliminates oscillatory movements and the transmission of shocks from the front wheels to the steering wheel.

The four-wheel brakes, which are of the Perrot-Bendix type, are applied by means of a pedal. A hand brake acts on the rear wheels only.

The comparatively small weight and the unusual road-holding ability of the car are said to make it possible to achieve very high average speeds even on poor roads.

Cincinnati Lathe Speeds Engine Piston Production

JUST when we are thinking about all kinds of special equipment, The Cincinnati Lathe & Tool Co. comes along with a standard lathe set-up which is claimed to finish pistons in less than four minutes apiece in moderate production. It is estimated that this time could be cut by one-third with cemented-tungsten-carbide tooling.

For the first operation, boring and facing the skirt, the piston is held in a 4-jaw Independent chuck. The diameter of the bore is held accurately to size by a micrometer dial on the cross screw.

The tooling for the second operation, that of boring the wrist pin holes, is shown in Fig. 1. The piston is located and held in a fixture having the angle plate fitted so as to align the holes central with the skirt bore. Holes are bored with a fly-cutter held in the bar and finish-reamed in the same setting.

Wherever production warrants it, the second operation could be tooled on a turret lathe so as to cut down floor-to-floor time. Here the rough as well as finishing bars could be piloted in a bush inside of the spindle, using double-end cutters for multiple cuts.

Fig. 2 shows the last operation of turning and facing with a single tool in the front rest and grooving with four tools in the rear. Work is centered by the skirt bore while held in a fixture fitted to the spindle nose. A pin is inserted through the wrist pin hole and then drawn tight with the hand wheel at the rear end containing the draw bar. Diameters are controlled by means of the micrometer dial.

The outstanding thing about this set-up is the fact that all operations may be handled by standard equipment with a few simple fixtures, thus bringing some of the cost advantages of high production to a relatively low production job.

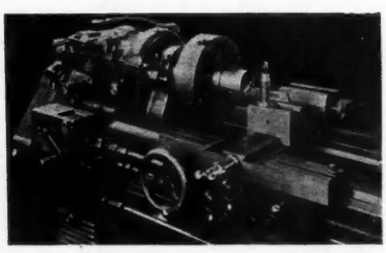


Fig. 1 — Showing tooling for boring wrist-pin holes in piston

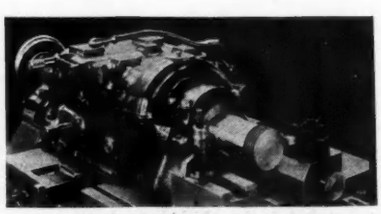


Fig. 2—Note single tool in front and four grooving tools in rear of work

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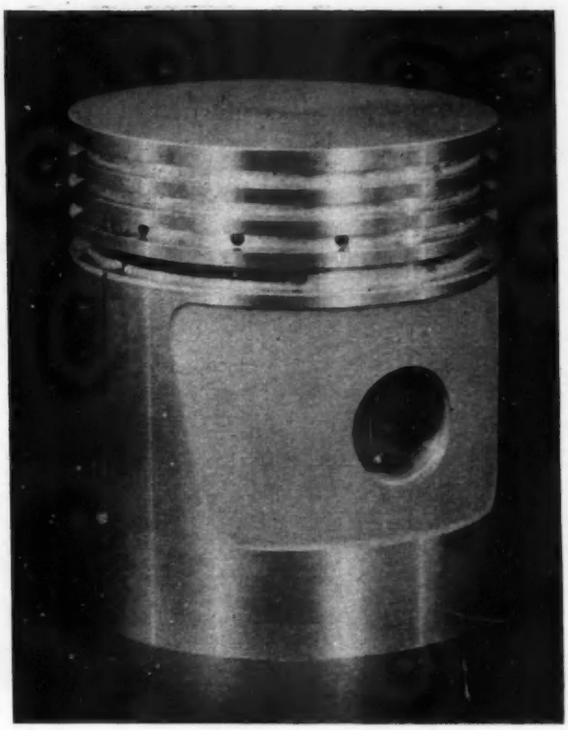
Road Machinery Adapts Passenger Car Design

ENGINEERING practices originated in connection with the manufacture of passenger cars are being introduced in various other lines. The latest industry to take advantage of the pioneer work of the motorcar manufacturers is that of road machinery. As an example, our attention has been called to a road maintainer recently placed on the market by the Pettibone-Mulliken Company of Chicago. In the past, the design of road graders has been under the influence of practice in the agricultural and general machinery fields, rolled sections and malleable and steel castings being the principal materials entering into the construction. The new Pettibone-Mulliken road maintainer, which was designed by E. C. Myers, has a long, curving pressed channel frame reinforced by an X cross-member. Four different makes of tractor engine are available for the powerplant. The machine embodies a number of automotive units, including the steering gear and the wheels, which latter are of the disk type and are fitted with pneumatic tires.

Lynite T-Slot Piston Developed for Engines



Lynite T-slot piston

ALUMINUM COMPANY OF AMERICA has developed a new light-alloy piston, known as the Lynite T-slot, which already has been adopted by a number of engine manufacturers, we are informed. The outstanding feature of this piston design is the T-slot, comprising only a small horizontal slot between the head and the skirt. Head and skirt are continuous for about 75 per cent of the circumference, thus assuring easy heat flow and a minimum piston-crown temperature.

The Lynite T-slot piston is cam-ground to present cylindrical thrust faces to the cylinder wall. The non-pressure sides are relieved a few thousandths of an inch near the piston pins. There is one horizontal slot, preferably in the bottom ring groove, and from the center of this a slot extends downward at a slight angle to the piston axis, toward but not through the bottom of the skirt. Loads due to gas pressure and inertia forces are distributed over large areas by the cylindrical, concentric thrust faces. The combination of the T-slot and the reliefs ground on the non-pressure sides are said to assure the desired flexibility.

Possibility of collapse is said to be eliminated by the fact that the vertical slot does not extend through the bottom of the skirt. The continuous band at the bottom can be fitted quite close to the cylinder bore, since this end of the piston is relatively cool, and close fitting at this end means good oil control. There are no openings around the piston bosses, which have a tendency to increase the oil consumption.

Owing to the method of cam grinding and slotting, comparatively little clearance is required. The clearance across the center of the thrust face of the average size T-slot piston is from 0.001 to 0.002 in. At the piston bosses the clearance is made from 0.008 to 0.010 in. Piston slap is said to be prevented by the low clearance at the thrust faces. When the engine is warm, the large clearance over the piston bosses is taken up almost completely through the exercise of the cylinder-conforming features incorporated in the piston.

As a rule, four piston rings are employed with the Lynite T-slot piston. In some engines three compression rings and one oil control ring are satisfactory, while in others it is advisable to use two compression rings and two oil control rings. Since the pistons are fitted so closely that there is no appreciable piston rocking to round off the edges of the rings, the life of the rings is said to be increased.

The holes through the piston bosses are preferably finished in a diamond-boring machine. Recommended practice for fitting full-floating pins is from pin-hole size to 0.0003 in. loose. If the pin is anchored in the piston, the anchored end may be, at room temperature, from pin-hole size to 0.0003 in. tight. In this case the floating end should never be too tight, good practice being to fit the end of the pin from pin-hole size to 0.0005 in. loose. The floating piston pin is preferred, as it is light, cheap and has the longest life.

The Lynite T-slot piston can be obtained in any of the aluminum piston alloys, including No. 132 alloy, or "Lo-Ex," which has a low coefficient of expansion, excellent bearing qualities, and a specific gravity less than that of commercially pure aluminum.

Mashinengetriebe

Mashinengetriebe, published by VDI Verlag, Berlin NW-7, Germany.

THIS is a reprint in handy form of five papers presented at a recent meeting of the German Society of Engineers devoted entirely to the subject of transmissions and drive mechanisms. The types of transmission mainly referred to are those used in machine tools, although transmissions similar to some of those discussed have been proposed for automobiles.

Dr. Kutzbach deals with mechanisms for producing a so-called scrubbing motion and with the wabble-plate mechanism. A paper by A. Bock deals with infinitely variable mechanical speed-change gears, describing three different designs, all employing roller ratchets, made respectively by the Getriebebau Co. of Dresden, Aldwych Engineering Co. of London, and Dr. Eng. Ljungstrom of Sweden. A paper by P. Grodzinski deals with the Geneva stop motion and other similar mechanisms used in machine tools; H. Liske discusses the Geneva stop motion and planetary gears as feed motions for presses, and Dr. O. Cosmann the stitch-forming mechanism of sewing machines.

Continuous Process Plays Role in Manufacturing of

Fig. 1—Machining corrugated core ribbon. Girls are forming the strips into core sections

by J. B.

ONE of the largest makers of automobile radiators is the Fedders Manufacturing Co., Buffalo, N. Y., making radiators for the Pierce-Arrow, White, Stutz, Overland, Chrysler, Marmon and others.

Today this concern has three plants:—No. 1 for the manufacture of radiators and mechanical refrigerator parts, and No. 2 for drawing, stamping and all kinds of sheet metal work and the machining of castings, while No. 3 is a completely equipped foundry.

The main plant, where the radiators are made, consists of a modern four-story building and the work is so laid out that all material and parts are moved in straight line progression from raw materials to finished product by continuous conveyor systems of various types. The metal stamping department is on the ground floor and here are produced the top and bottom tanks, side walls, stud bars, etc. This section is equipped with power shears, brakes, benders, blend seamers, punch presses, drill presses, etc.

The top tanks are made in from one to four operations according to type, as for instance, stamping, shearing and punching. A heavier metal stamping department, also on this floor, has two long lines of power presses, the two largest being of 120 tons capacity each, while the others grade down to progressively smaller sizes. Here the shells, which are shipped separately, are formed in a single operation, including a right angle bend and beading. The edges are then trimmed in a cutter.

The nose for the filler neck and name plate is formed by a separate drawing operation after the "spot" has been annealed, and this is accomplished by holding a gas-oxygen torch against the metal until it comes to the proper temperature and then cooling.

*The American Gas Association

The tanks are moved to the second floor and distributed to two long lines of soldering benches where the workmen use gas-heated soldering irons. The water inlet pipe or hose connection and the splash plate are soldered onto the top tanks, and the outlet and drain pipes onto the bottom tank. The seams of both tanks are closed with solder and the filler necks and brackets are soldered on. The work moves down the rows of benches on traveling conveyors and the operators remove them for certain operations and replace them for transfer to the next. Aprons are put on in another room.

The assemblies are made on the third floor but the cores are produced on the fourth. The raw material for the cores is simply a plain brass ribbon and the depth of the core is regulated by the width of this ribbon. A roll is hung on a fixture and the ribbon fed into a machine containing opposing steel rollers with teeth cut across the face of each and operating together like two gears. These form corrugations in the ribbon as it passes through (see Fig. 1). When one of these ribbons is folded together on itself with another inserted between, a complete honeycomb ribbon, or cone section, is formed. The edges are soldered to make the whole water-tight.

The inner ribbon is formed like the outer but with a different die which also forms fins and makes perforations. These divide the air spaces into small cells against the water line, thereby increasing the radiating surface many times. The water flows down vertically between the ribbons while the air passes straight through the cells from front to rear.

All of the ribbons or cone sections converge at a

Important Radiators

Fig. 2—Dipping faces of radiator cores into molten lead bath to solder seams. Gas-fired furnaces employed

Nealey*

central point where they are sorted out according to length and type of radiator. To make up the radiator core a number of these ribbon assemblies are placed in a cast iron frame which can be adjusted to the exact shape and size of the finished radiator. The number of these ribbon assemblies to a core varies from 55 to 90, and even more are used in some.

For soldering the edges of the ribbon assemblies together a battery (Fig. 2) of eight rectangular cast iron soldering kettles is provided. These kettles are four feet square and a foot deep, are hooded and set in brick foundations. Under each kettle is a combustion chamber, and four gas burners, ring type, are located therein. Close control of the temperature must be maintained to insure an even flow of solder so as to make a smooth and tight joint. Even temperature distribution must be had on the lower surface of the kettle to insure uniform heating within the bath and to prolong the life of the kettles.

On each side of each soldering kettle is a shallow tank of acid so that two crews of men can work at one soldering kettle at a time. Two operators pick up the radiator core and frame with a two-handled fixture and lay it on top of the acid bath and then the solder kettle. The face of the radiator then lies ¼ in. deep in the molten solder and the seams are quickly closed. The operators then turn it over and dip the other face.

The ends are soldered in a bank of six smaller kettles, gas fired. After washing and drying with steam in the open air the cores are dropped on a spiral roller conveyor to the third floor where they are automatically discharged onto a traveling belt conveyor traversing the length of the room.

The radiators are transferred to another conveyor

Fig. 3 — Overhead traveling conveyor with "ice tong" fixtures which grip and carry radiator. Note roller conveyor below for inspection. Continuous washing machine in background

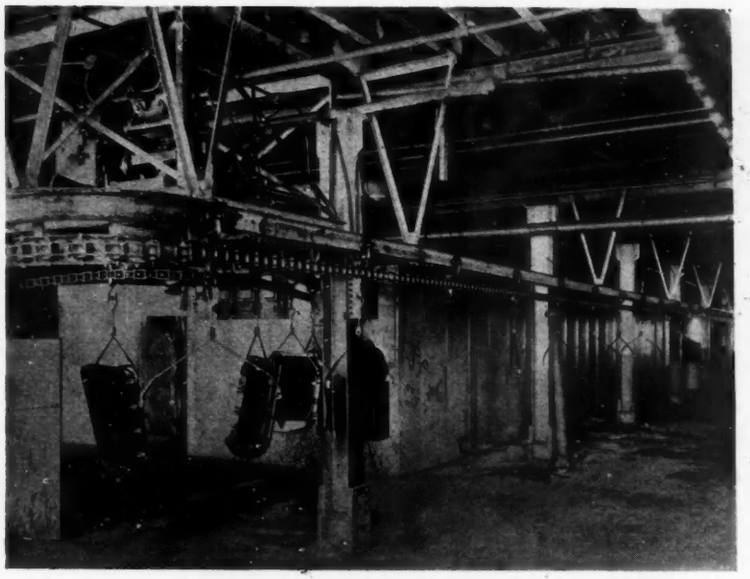


Fig. 4 — Radiators sprayed with japan move on an overhead chain loop conveyor through oven

passing through a washer. This conveyor consists of two looped chains operating on sprockets and set 9 in. apart, with steel slats riveted to both chains on 9 in. centers, for the radiators to set on. Another parallel chain operates above this for the radiator to lean against. The washer is made of sheet steel and is 15 ft. long, 7 ft. high and 4 ft. wide. It contains a series of water jets which spray water onto the work as it travels along. At the discharge end the radiators are transferred to a 23 ft. roller conveyor for inspection and then are placed on carriers (Fig. 3) suspended from an overhead chain conveyor. These carriers are unique and closely resemble ice tongs with steel, leather-lined grips attached to the tips. The radiators are thrust upward through these grips and when released their weight causes the tongs to hold them fast.

This conveyor ends in another department where the radiators are transferred to steel frames on stands where the tops, bottoms and tanks are soldered on. A gravity roller conveyor then moves them on to the testing line where the outlet is plugged, a pressure air hose connected with the inlet and the whole submerged in a tank of water to locate any leaks. They are then put into other frames holding the side walls, made up on a parallel line, and these are then soldered on, together with the overflow pipe. This completes the core and tank assembly.

Passing through a set-up with six steam nozzles, steam is forced into each radiator and the section of roller conveyor beyond is so constructed that it can be tilted up to allow the condensate to drain out.

The radiators are sprayed with japan which is baked on while moving on an overhead motor-driven chain loop conveyor, one side of this loop being approximately 70 ft. long. The oven is about 30 ft. long, 15 ft. wide and 8 ft. high and one loop of the conveyor extends some 40 ft. beyond to accommodate the spray booths and give flexibility to the unit in case of excess production, or interruption in handling. The chain makes five passes in the oven and emerges from the end opposite to which it entered. Right here is an extension of this conveyor, a loop passing down through the floor to the shipping room, and returning.

Cummins 125 hp. Diesel Used in Indiana Truck

THE new Diesel engine developed by the Cummins Engine Co., as described on page 209, Aug. 13 issue of *Automotive Industries,* is known as the Model H. Due to an error, a gasoline powerplant was shown with the Cummins engine illustrated in the article describing the Indiana Motors Corp. truck.

The Cummins Diesel engine is a six-cylinder, 4⅞ x 6 in., developing 125 hp. at 1800 r.p.m., weighing only slightly more than that of a gasoline engine of similar rating.

The fuel pump and governor are built as a single unit mounted on the left side of the engine, which is removable without disturbing other units. It is pressure-lubricated from the main lubricating system of the engine.

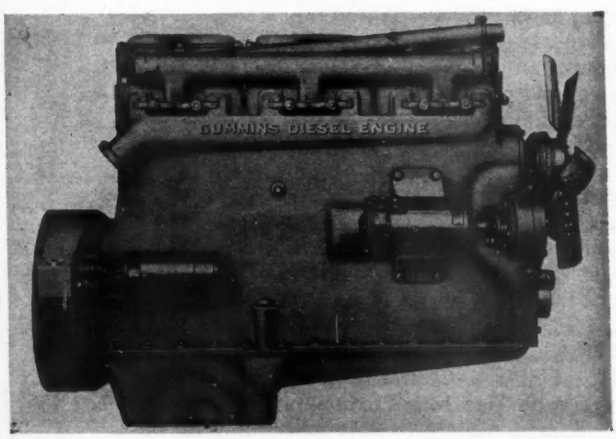
The fuel pump is of the Cummins distributor type, which meters the charge to each cylinder by a single metering plunger for all cylinders. Oil is delivered under relatively low pressure from the pump to an injector at the head of each cylinder.

Cylinders and crankcase of the engine are cast integral of alloy iron. Removable cylinder sleeves are used.

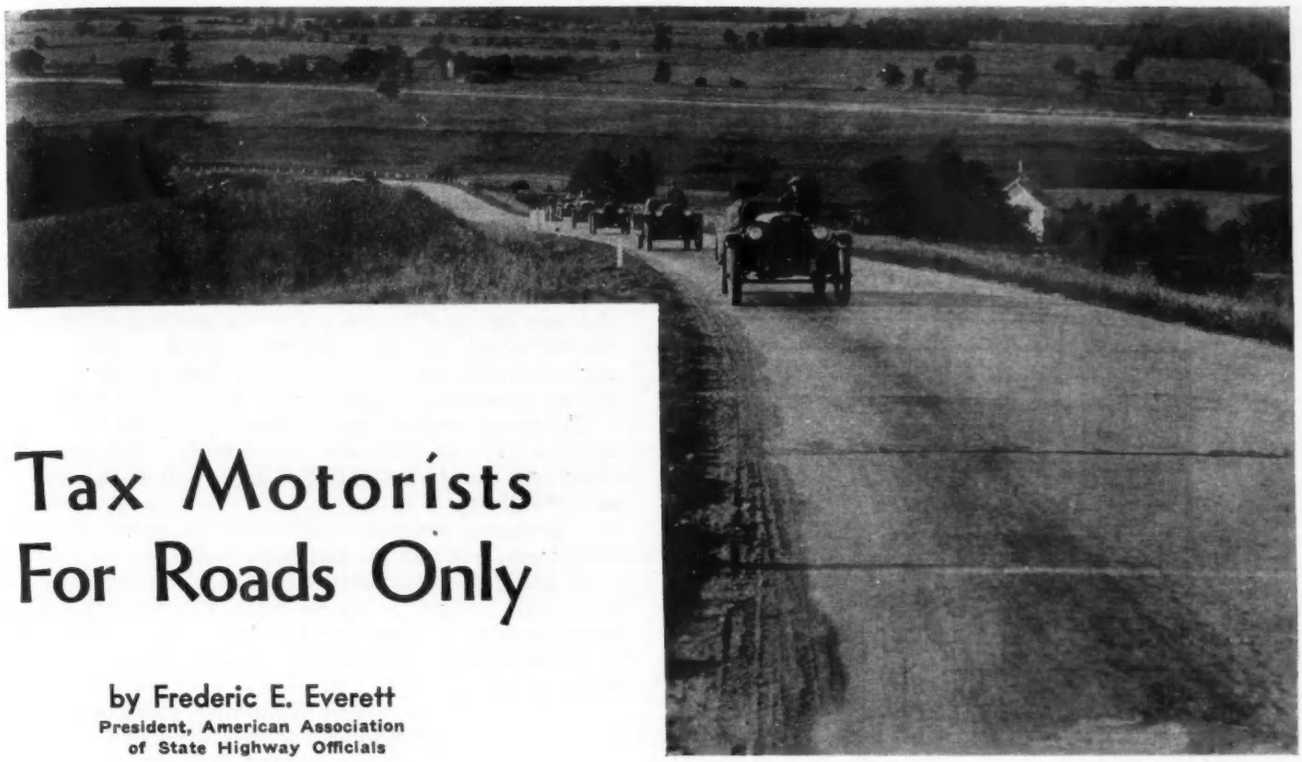
The crankshaft is carried in seven interchangeable main bearings and is forged from alloy steel with counterbalances.

Piston pin bearings are pressure-lubricated through a rifle-drilled hole in the connecting rods. Pistons are of alloy iron carrying four compression rings and one oil control ring.

The camshaft is supported on seven bearings and is drilled to serve as the main oil distributing line.



Exhaust side of Cummins 125-hp. engine



Tax Motorists For Roads Only

by Frederic E. Everett
President, American Association of State Highway Officials

TWO short years ago, the phrase "diversion of road funds" was quite unknown to the average motorist. Then, only $15,000,000 of the money contributed by motorists to road building through gasoline taxes and motor license fees was used for purposes other than road building.

But today it is a different story. The diversion in states in 1931 was $20,000,000—in 1932 it will total no less than five times that amount, $100,000,000! But the diversion in states is only a start. The Federal government through its newly imposed taxes on gasoline, oil, sales of automobiles, parts, accessories and tires and tubes, will add at least $150,000,000 in diversion—a total of a quarter billion dollars!

Just why people should pay $250,000,000 of the expenses of general government, simply because they own automobiles, is puzzling, particularly so to those who must pay this charge.

Diversion Burdens Wrong People

Most diversion occurs through the abuse of money paid out by motorists through the gasoline tax. Diversion makes the gasoline tax a class tax, something it can't possibly be in respect to the principles under which it was created. The gasoline tax is really not a tax but a toll whereby a service charge is collected from motorists in proportion to their road usage. As a road toll it is equitable and fair. But when it is forced to become a class tax it is extremely unfair, for it loads too much of the costs of general government on people of moderate and insufficient resources. Car registrations reveal that most automobile owners are of limited means, else there wouldn't be some 25,000,000 motor vehicles in operation. The bulk of these motor car owners pay property taxes, so why tax them again for the general expenses of government?

Diversion is short-sighted. Many states have financed road bonds with gasoline tax income. Diversions in these states would automatically make the bonds an obligation of property, with the possibility of higher property taxes.

The highway transportation industry is composed of automobile manufacture, operation of filling stations and garages, bus and truck operations, road building and the manufacture and supplying of road equipment and materials. In 1931 this industry went along, all in all, under flying colors. But this year it is different. Road funds have been reduced through diversion. Road income has been curtailed through excessive taxation of motor vehicle operators, for when the expenses of motoring become too high less use is made of motor cars. This business of highway transportation normally furnishes employment for nearly 8,000,000 people, one out of every six workers in the country. Why, then, let Federal taxes and state diversions impede this greatest employer of men?

From all over the country come reports of reduced income from gasoline taxes and motor vehicle license fees. Pennsylvania, for example, expects a 10 per cent drop in highway revenues for the year.

Lessened incomes from these sources mean that highway building is to suffer even without diversion; that if states plan to keep up a semblance of new highway construction they must retain road funds for roads. In the face of reduced road funds and the new quarter of a billion dollar burden imposed on motorists by the Federal government, diversion becomes distinctly bad business.

Electric, Double-Acting Fuel P

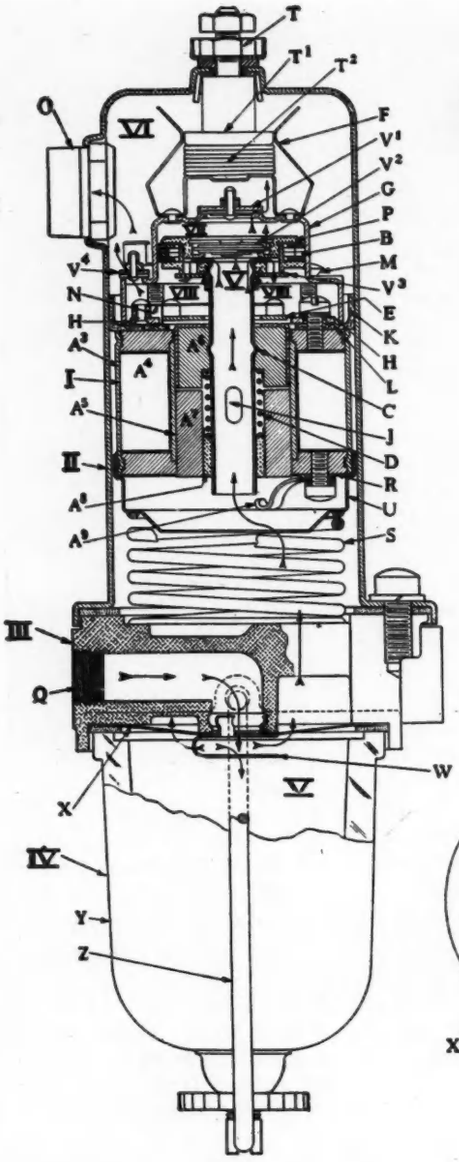


Fig 1

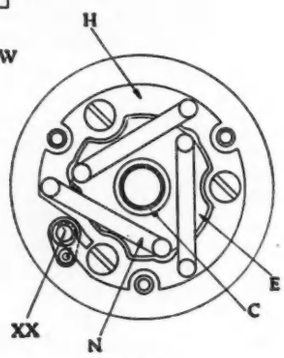


Fig 2

AN electrically operated, double-acting piston-type pump for fuel systems has been developed by the Stewart-Warner Corp. of Chicago. It is operated by current from the starter battery and starts operating the moment the ignition switch is closed. Owing to the double-acting feature the capacity is greater than that of other pumps of similar dimensions. While the delivery of the pump varies with the length and size of the tubular connections, with 10 ft. of 5/16-in. tubing on the suction end, 12-in. lift, and 2 ft. of 5/16-in. tubing between pump and the carburetor, the pump is said to deliver more than 20 gal. per hr.

One advantage claimed for this pump is that it can always be so mounted that engine heat does not cause vaporization of the fuel and consequent vapor lock. When the ignition is shut off no fuel flows to the carburetor, and there can, therefore, be no loss of fuel in case of a leaky carburetor.

In addition to its use as a sole means of fuel supply to the engine, this pump can be used also as a reserve, in which case it is connected in series with the regular fuel pump. This is made possible by the fact that fuel will flow through the pump without its being operated. Thus a fuel supply is assured in case the regular pump fails for any reason.

The pump consists of four main elements or group assemblies. These elements and the chambers of the pump are designated in Fig. 1 by Roman numerals as follows:

I. Element comprising all working parts of both the power unit and the pumping unit.

II. Pump housing with outlet O, battery terminal T, contact ring T^1, and rheostat T^2, the latter two being insulated from the pump housing.

III. Aluminum mounting casting with baffle W and strainer X.

IV. Sediment bowl Y of glass or metal, and bale Z to hold the bowl securely in place. Cork gaskets are provided between II and III and between III and IV.

V. Main suction chamber.

VI. Main discharge chamber separated from main suction chamber by cup leather L.

VII. Main pumping chamber.

VIII. Differential pumping chamber.

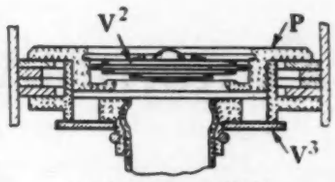
Plunger A^6 is pressed onto guide tube C and fastened in position, while pumping piston P is fastened securely to the top of the tube. Guide tube C also acts as the inlet passage for the fuel. Piston P is provided with four bakelite rings B, the top and bottom rings being solid, while the two middle rings are split and fit snugly into the bore of the pump chamber G.

Piston P divides G into two chambers, the upper or main pumping chamber VII, and the lower or differential chamber VIII. The discharge valves V^1 and V^4 are spring-actuated valves, being held in position by clock steel spring. Both these valves are faced with leather to assure quietness of operation. Valves V^2 and V^3 are inlet valves for chambers VII and VIII respectively. They are inertia valves, and therefore require no springs. Both have split-ring stops. On the down or magnetic stroke of the plunger A^6 and, therefore, of the piston P, valve V^2 is opened by inertia and valve V^3 is closed by inertia. On the up or spring stroke of the plunger and piston, V^2 is closed and V^3 is opened.

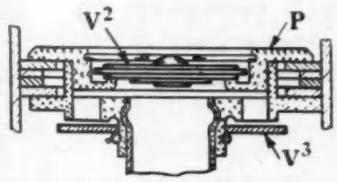
As piston P is reciprocated rapidly by plunger A^6, a high vacuum is created in chamber VII and VIII, through the action of the valves, insuring a rapid prime of the pump, the fuel being drawn into the pump at inlet Q, past baffle plate W into sediment bowl Y, filling same.

Thence the fuel flows through strainer X, suction chamber V and tube C to inlet valves V^2 and V^3, and into chambers VII and VIII respectively, filling same. The pump now being primed, its action is as follows: On the down stroke of piston P, inlet valve

Pump by Stewart-Warner



DOWN STROKE



UP STROKE

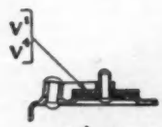


Fig 3

V^2 is opened by inertia and fuel flows into chamber VII. The down stroke of piston P also closes inlet valve V^3 by inertia, and fuel trapped in chamber VIII is forced out through discharge valve V^4 into pressure chamber VI. The upward movement of piston P closes valve V^2 by inertia, and fuel trapped in chamber VII is forced through discharge valve V^1 into pressure chamber VI. The upward movement of piston P also opens inlet valve V^3, and fuel flows into chamber VIII. This explains the double action of the pump, whereby fuel is being discharged on both the up and down strokes. From the pressure chamber the fuel is discharged through outlet O to the carburetor.

The function of the resistance coil or rheostat T^2 is as follows: Under normal working conditions of the pump, the power and pumping unit I does not move, and contact spring F always remains in contact with contact ring T^1. The normal shut-off pressure of the discharge fuel (as when float valve of carburetor is closed) is controlled by plunger spring D, which maintains a shut-off pressure of from 2½ to 3 lb. in discharge chamber VI. The pressure-regulating spring S is of a higher value than spring D, allowing 4 lb. pressure in discharge chamber VI before being compressed.

Main unit I will move downward against spring S only in case of failure of inlet valve V^2. Failure of valve V^2 would relieve all work from the top of piston P in chamber VII, and the pump would speed up. The down stroke of piston P is the power or magnetic stroke of plunger A6 and is much in excess of the power of spring D. This down stroke is also the discharge stroke for chamber VIII.

Armature mounting ring H and, therefore, armature plate E is insulated from the coil assembly, and the pumping chamber G by the cup leather L. Armature E does not touch guide tube C as it has a clearance hole in the center. The only point H contacts is at XX (Fig. 2) which is the upper terminal of the coil. Also with the pump at rest plunger A^6 and armature E are pressed firmly together by plunger return spring D.

The electric circuit is as follows: From battery terminal T and contact ring T^1 through contact spring F, pumping chamber G, pumping chamber mounting screws M which are threaded directly into upper spool end A^1, through barrel A^5 to A^7, through spring D and plunger A^6 to armature plate E, to armature ring H, which contacts with the upper terminal of the coil winding, through the coil to the lower terminal of coil A^6, which contacts with spring retainer U, through spring S to mounting casting III, which is grounded. The power and pumping unit I is insulated from pump housing II by the cup leather L at the top and insulator R at the bottom.

The power-unit barrel A^5 being of bronze, and the guide tube C of aluminum, both of them non-magnetic metals, the magnetic circuit is from upper spool end A^1 through armature plate E, plunger A^6, iron sleeve A^3, lower spool end A^2 and pole piece A^7 to plunger A^6.

Referring to Fig. 4 view A shows the parts in the position of "rest," that is, when the ignition circuit is not closed, plunger A^6 being held firmly in contact with armature E by the plunger spring D. Closing of the circuit by turning the ignition switch causes a strong pull to be exerted between armature E and plunger A^6,

(Turn to page 343, please)

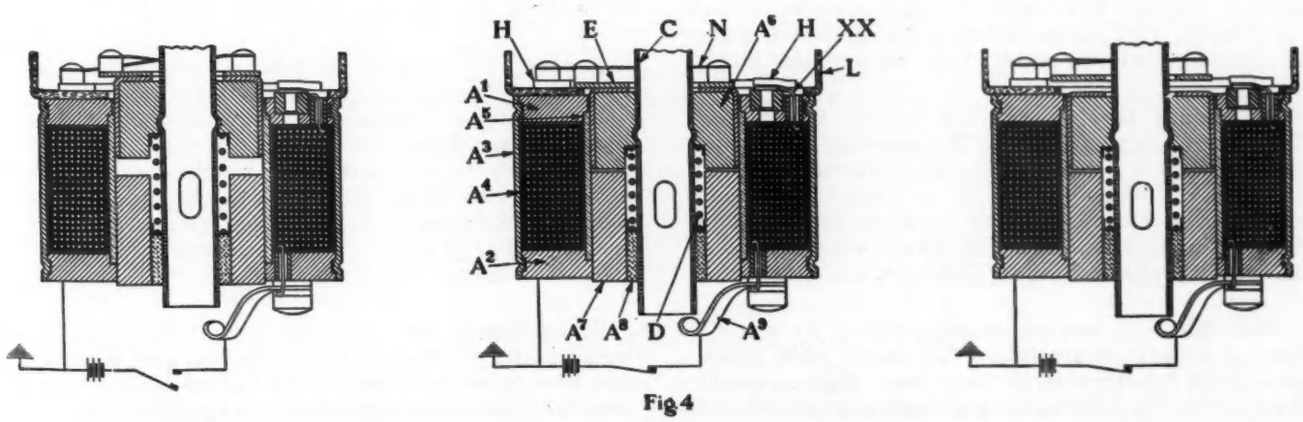
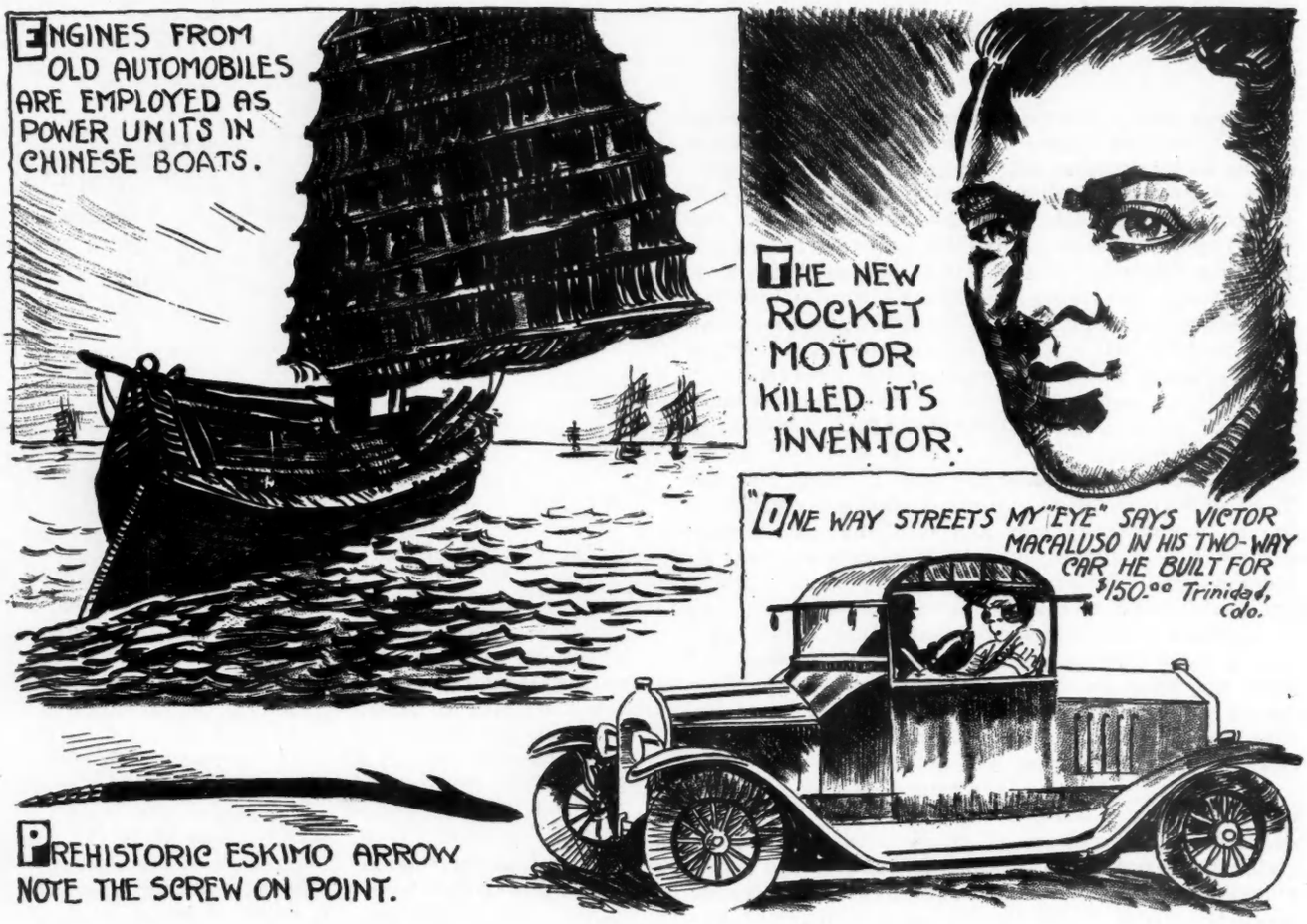


Fig 4

A B C

Automotive Oddities—By Pete Keenan



Write us if you know an oddity

The News Trailer

Women drivers (back-seat and front-seat varieties) buy gasoline and oil in 73 per cent of car-owning families, a survey made by the *Household Magazine* shows. Perhaps those advertising masterpieces, octane rating, fuel characteristics, and prehistoric age of oils, might well be revised to give a feminine touch.

A jammed throttle resulted in W. D. "Eddie" Edenburn, chairman of the Harmsworth Race, and other notables getting a ducking Thursday before the race. The party were out to inspect the course on Lake St. Claire, and the boat, at speed, didn't take to the heavy swells. "All hands overboard" . . . oh, what's another cigar in Edenburn's life, anyway?

Sixty-five U. S. aircraft engines power the world's longest scheduled air line. The route, 9500 miles, runs from Amsterdam to Java, over typhoon-swept seas, across the lofty Himalayan passes and plateaux and high above the "chaste minarets of Persia"—setting of less-chaste tales known as the Arabian Nights. And a descendant of a Caliph of old (one who had a flying carpet, according to the best legends of the land) is a manager of part of the route.

Because the Treaty of Trianon prohibits Hungary from maintaining military aviation, Hungarians of all political faiths agree that the aero office of the commerce department should be well financed.

According to an eminent correspondent this is about the only thing all parties agree upon—since the government recently quadrupled its appropriation for this office in spite of a general reduction in the 1932-33 budget.

Soviet Russia has risen among the nations of the world in its mileage of regularly operated airlines, and now is second only to the United States. The length of the Soviet lines in active operation in 1932 is placed at 55,000 kilometers, or about 35,000 miles.

NEWS

July Production Under June Total

111,139 Units Built in U. S. for Month; 7 Months, 982,562

WASHINGTON, Sept. 6—Production of motor vehicles in the United States dropped to 111,139 units in July as against 183,092 in June, according to reports received by the Bureau of the Census from manufacturers.

Passenger car output declined to 94,678 from 160,103 and truck production decreased to 16,434 from 22,754. Only 27 taxicabs were manufactured.

In the first seven months of 1932 motor vehicle production in the United States totaled 982,562 as compared with 1,791,425 in the corresponding period of last year.

Canadian production in July made a slight gain to 7472 from 7112 in June. Passenger car production was 6773 and truck output was 699.

August Motor Output Estimated at 89,855

Production of motor vehicles for August was placed at 89,855 units in the preliminary estimate of the National Automobile Chamber of Commerce submitted at a meeting of the organization's Board of Directors in Detroit, Wednesday, September 7.

This was a decline of 24 per cent under the July output. The industry's production for the year to date was estimated at 1,119,558 or 46 per cent under the output for the corresponding period last year.

Continental-DeVaux Engineers in Detroit

DETROIT, Sept. 7—The engineering department of Continental-DeVaux Motors Co. has been transferred from Grand Rapids to the main executive building of Continental Motors Corp. here.

A staff of approximately 70 is maintained in Detroit by Continental.

Ford Rouge Plant Reopened Tuesday

DETROIT, Sept. 8—The Rouge Plant of the Ford Motor Co. reopened Tuesday morning, recalling the men who were employed there at the time the plant closed for inventory three weeks ago. No new employees were added.

Goodrich Sells Hood Rubber

Control Goes to Officers of Subsidiary After 3 Years' Control

AKRON, OHIO, Sept. 5—The B. F. Goodrich Co. has relinquished control of the Hood Rubber Co. by sale of its major interest in the subsidiary to principal executives of the Hood company, it was announced here this week.

Under the new management headed by Arthur B. Newhall, vice-president and general manager, Goodrich will maintain an interest in Hood through retention of a minor part of the outstanding common stock with voting power.

Goodrich acquired the Hood company in August, 1929, through the exchange of common shares, and a year later transferred all its boot and shoe manufacturing activities to the Hood plant at Watertown, Mass. Manufacture of all Hood tires is now centered in the Goodrich plant here and this branch of the Hood company is not involved in the change of management.

J. D. Tew, president of Goodrich, said arrangements were made for the Hood company to continue the manufacture of Goodrich branded footwear for distribution through the B. F. Goodrich Footwear Corp.

New officers of Hood are: Arthur B. Newhall, president; Raymond H. Blanchard, vice-president; Alden C. Brett, secretary, and Carroll P. Griffith, treasurer. Tew remains as a member of the directorate.

Correction

In the ranking of the different makes selling in the eight-cylinder field, published on page 297 of our Sept. 3 issue, Cadillac and Pierce-Arrow were accidentally interchanged.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

NEW YORK, Sept. 8—Business sentiment throughout the country continued to improve last week despite the fact that there was a moderate downward reaction in some security and commodity prices and that there was no appreciable improvement in the actual level of industrial and business activity as a whole.

However, the downward readjustment in security and commodity values was comparatively small, and these markets displayed fundamental strength.

Among the larger industries, textiles made the best showing.

Credits have become easier as business sentiment has improved and gold stocks have increased.

The country has gained more than $200,000,000 in gold since the middle of June, and a considerable part of the increase is attributed to the shipment of gold in payment for purchases abroad of American securities.

FREIGHT LOADINGS GAIN

Railway freight loadings during the week ended Aug. 20 totaled 518,642 cars, which marks an increase of 6211 cars above those during the preceding week, but a decrease of 229,958 cars below those a year ago and a decrease of 421,916 cars below those two years ago.

FARM PRICES UP

The index of prices of farm products on Aug. 15 was 59 per cent of the prewar average, as against 57 per cent a month earlier and the record low of 52 per cent in June.

MORE ELECTRIC POWER

Production of electricity by the electric light and power industry in the United States during the week ended Aug. 27 was moderately above that in the preceding week but 12.3 per cent below that a year ago.

CRUDE OIL INCREASED

Average daily crude oil production for the week ended Aug. 27 amounted to 2,114,000 bbl., as against 2,110,800 bbl. for the week before and 1,751,550 bbl. a year ago.

FISHER'S INDEX UP

Professor Fisher's index of wholesale commodity prices during the week ended Sept. 3 stood at 62.5, as against 61.9 the week before and 61.8 two weeks before.

BANK DEBITS OFF

Bank debits to individual accounts outside of New York City during the week ended Aug. 31 were 34 per cent below those a year ago.

STOCK MARKET FIRM

The stock market last week was irregular with moderate downward reactions in many issues. The railway issues made a good showing. Despite the reactions, the market showed a basic firmness. The volume of trading was fairly large. Net changes in prices were mixed, but the advances predominated.

FEDERAL RESERVE STATEMENT

There was a little change in the amount of Federal Reserve credit outstanding during the week ended Aug. 31. Holdings of discounted bills increased $6,000,000.

Changes in holdings of bills bought in the open market and Government securities were negligible.

The reserve ratio on Aug. 31 was 58.9 per cent, as against 58.9 per cent a week earlier and 58.4 per cent two weeks earlier.

Stocks Up 39%, Double In Value Since June

Seven Representative Motors Gain Quarter Billion During Period

NEW YORK, Sept. 6—The market value of 100 representative common stocks increased $3,134,248,000, or 39 per cent, in August to $11,166,940,000 at the end of the month, according to Frazier Jelke & Co. The 100 issues now are appraised at 100.5 per cent more than on June 30.

Since the end of June the motors, rails, steels and electrical equipments have more than doubled in price, while the amusements are up 199 per cent and the mines are up 222 per cent.

On a percentage basis the largest increase during the month of August was a gain of 87.8 per cent in the mines. The steels were up 62.2 per cent; the amusements, 60.3 per cent; the rails, 56.9 per cent; the utilities, 47 per cent; the electrical equipments, 46.6 per cent; the motors, 42.0 per cent; the industrials, 37.5 per cent; the chemicals, 36.3 per cent; the railroad equipments, 33.5 per cent; foods, 24.2 per cent; the oils, 20.6 per cent; and retail shares, 12.1 per cent.

The largest gain in dollars was $635,234,000 in the utilities. The rails were up $504,116,000; the oils, $375,368,000; the motors, $262,656,000; and the mines, $253,569,000.

The increase of $3,134,248,000 in August was larger than the gain of $2,464,145,000 in July; but on a percentage basis the July gain of 44.2 per cent was bigger than the August gain of 39 per cent.

The following table shows the extent of price changes by groups during the month of August:

	July 30, 1932 ('000's omitted)	August 31, 1932 ('000's omitted)	Per Cent Increase
15 Rails	$879,197	$1,383,313	56.9
10 Utilities ...	1,346,009	1,981,243	47.0
14 Industrials .	582,042	799,926	37.5
10 Oils	1,815,973	2,191,341	20.6
7 Mines	288,394	541,963	87.8
7 Motors	625,645	888,301	42.0
5 Steels	324,586	527,412	62.2
5 Equipments	133,757	178,358	33.5
5 Electricals .	519,179	761,529	46.6
5 Chemicals .	342,634	463,338	36.3
7 Foods	552,966	686,087	24.2
5 Merchandise	483,352	541,403	12.1
5 Amusements	138,951	222,720	60.3
Totals	$8,032,692	$11,166,940	39.0

Earl William Be Saw

Earl William Be Saw, president of the Firestone Tire and Rubber Co. of Canada, died suddenly Sept. 5 at Hamilton, Ont., aged 46. He had seemed in his usual robust health but suffered a seizure and expired.

Mr. Be Saw was associated with the Firestone company for 25 years and was president since 1930. Born in Akron, he entered the service of the company when 21 and rose steadily.

In 1919 he was appointed general sales manager and in 1922 became vice-president and general manager, the position he occupied until he was chosen president of the Canadian company.

Public-spirited, Mr. Be Saw was interested in many local organizations and took an active part in sports. Surviving are his widow and twin daughters, Jane and Janet.

N.S.P.A. Financial Standing is Good

Chalfant Reports $14,000 Reserve During 8 Months

DETROIT, Sept. 7 — Reporting the accumulation of a reserve for contingencies during the first eight months of this year of over $14,000, E. P. Chalfant, executive vice-president of the National Standard Parts Association, has announced that the association is in the best financial condition since its organization in 1924.

"It is particularly gratifying to make this announcement right at this time when a great majority of trade associations in all lines of industry are finding it very difficult to retain their membership sufficiently to enable them to continue.

"Our enviable position is, I feel, a testimonial to the soundness of the policies on which the N.S.P.A. has been built.

"We estimate that our reserve from 1932 operations will be further increased to approximately $20,000 by the end of our fiscal year on Oct. 31."

Krohn is Sales Head of Continental-DeVaux

DETROIT, Sept. 7—W. R. Angell, president of Continental Motors Corp., has announced the appointment of Henry C. Krohn as general sales manager of the Continental-DeVaux Co. He was formerly vice-president and general sales manager of Federal Motor Truck Co.

Chrysler Percentage Gains

DETROIT, Sept. 7—For a year to date, including all states for first six months and 31 states for July, registration of Chrysler Motors cars is 104.3 per cent of registrations for same cars and same states during same period last year.

Rockne Shipments Up

DETROIT, Sept. 6—Shipments of the Rockne Motors Corp. during August increased 38.3 per cent over July, the increase on the 75's being 11.4 per cent and on the 65's, 53.5 per cent.

Canadian Air Brake

KITCHENER, ONT., Sept. 6—A new line of air brakes and power brakes is now being manufactured in Canada by the Automotive Power Brake Co., Kitchener, Ont.

Steel Active As Orders Increase

Releases, Temporarily Delayed, Step Up Mills Following Labor Day Holiday

NEW YORK, Sept. 8—While reports of higher operating rates in some of the steel producing districts pertain chiefly to the primary forms of steel, activities at finishing mills also began to show improvement following the Labor Day holiday, principally as the result of receipt of shipping releases that had been temporarily postponed.

The United States Steel Corp.'s unfilled tonnage statement of Aug. 31, which is to be made public Saturday noon, is eagerly looked forward to because of its possible effect at this time on the purchasing policies of steel consumers.

It is hoped that this statistical report, little significance as it may have had at other times in the last year or two, will give corroboration in figures of the turning of the tide in steel demand. Rumor has it that there has been quite a little buying of steel during the last week in August and that this will be reflected in the leading interest's backlog at the end of that month.

This, it is felt in the steel market, would help considerably in making for quicker decisions on the part of buyers who heretofore have felt that they have everything to gain and nothing to lose by playing a waiting game.

So far as prices are concerned, the only effect which a gradual upswing in commitments is looked for to have, will be to lessen the opportunities for concessions in the sheet market.

It is generally understood now that fourth quarter quotations for sheets will remain unchanged. The latter, however, have been subjected to considerable competitive abrasion. Sellers pin their faith in broader demand as a cure for this ragged condition of the market. For the time being, however the market's scales continue decidedly to tip in buyer's favor.

Pig Iron—Further improvement in scrap prices has imparted a firmer undertone to the pig iron market. Buying by automotive foundries is still in abeyance.

Aluminum—Quiet and unchanged.

Copper—With the advent of 6c copper, a revival of interest on the part of consumers as well as speculators is noted in the market for the red metal. The 6c, delivered Connecticut Valley, price level is the highest since last April and compares with 5¼c a month ago. Actual buying, however, has so far not shown very much of a bulge, the prop for the advance being solely the attitude of producers who are determined to obtain a higher price for their stocks and, with that in mind, are unwilling to commit themselves beyond December deliveries.

Tin—London lifted the price of Straits tin still higher over Labor Day and the market here opened on Tuesday at 25¼c, approximately $78 a ton higher than it was possible to buy at a month ago and only $33 a ton below the price of the metal a year ago.

Lead—Strong and fairly active.

Zinc—Higher and firm.

Wood to Try For World Speed Mark Against Kaye Don's Time

119.81 m.p.h. Set by Britisher at Loch Lomond Will Be Attacked by Miss America Owner Soon, Detroit Hears Following Harmsworth Victory

by Athel F. Denham

DETROIT, Sept. 8—An attempt at the world's speed record for boats is to be made shortly by Gar Wood, according to an announcement he made immediately following the conclusion of the second and deciding race for the British International or Harmsworth Trophy.

Given a good course and reasonable luck with his powerplants, there seems to be but little doubt that a new mark will be established.

Just exactly what Miss America X will do on a straight-away run is still in doubt. Judging from the performance of the boat during the race at the speed the engines were turning, a rough estimate would place the top speed at somewhere between 130 and 135 m.p.h.

Whether or not Gar Wood would attempt to place any new mark as high as this is also open to question.

Disappointing as this year's match for the trophy was, with Kaye Don's consistent trouble with throttle connections, it did serve to demonstrate the superior boat-building ability in this country again. Wood's "engine warehouse," as he designated Miss America X, on the whole took the choppy water of Lake St. Clair better than did Miss England III, even though the difference was not as marked as in previous years.

As to the race itself, the honors for the best time go to Kaye Don in Lord Wakefield's boat. The first lap of Saturday's race, with an official time of 88.685 m.p.h. for Don, was actually run much faster than this.

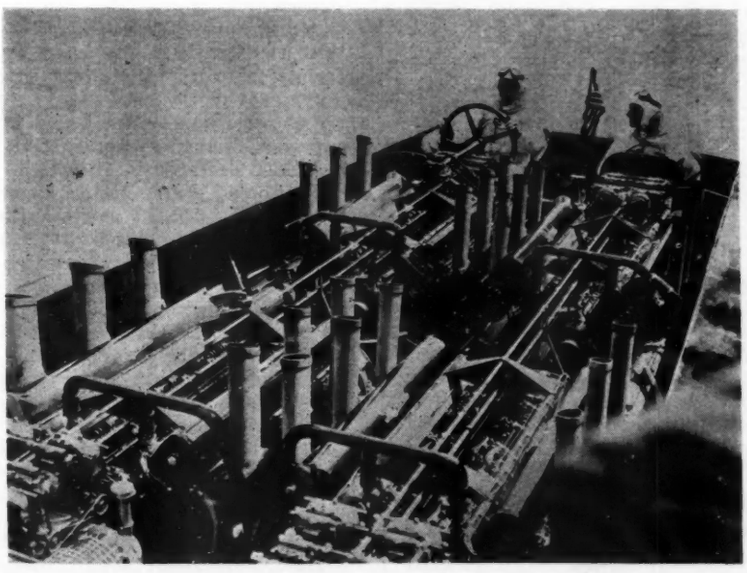
Don started over the line 15 sec. late, and, since time is figured from the starting gun rather than the actual start, the 15 sec. would have to be subtracted, giving an actual lap speed for Don's boat of virtually 93 m.p.h.

Wood's fastest lap was 87.4 m.p.h. during the first race. His average for the race was 78.5, due to slow times on the third and fifth laps.

Miss England III's starboard engine is being repaired for a demonstration run at Toronto late this week or early next week. When a throttle connection to the starboard engine on the boat broke during the first lap of Monday's race, Don attempted to proceed on the port engine alone, but in the middle of the second lap seized a piston, forcing him out.

It is estimated that approximately 150,000 people saw Saturday's race, and better than 300,000 stayed up all night or got up long before dawn on Monday to see the final heat.

Don's time for the first race was 71.265 m.p.h. for the 35 nautical miles. A check of the lap times shows that Wood did not pass Don actually in that first race until after the final lap had started. When he did pass, Wood was traveling at a clip estimated as well in excess of 100 m.p.h. *(See page 327.)*



Gar Wood, right, seated in his Miss America, shortly before winning the 1932 Harmsworth Race

Doolittle Wins Thompson Trophy

Mrs. Haizlip Flys Husband's Ship to Woman's Land Record

MUNICIPAL AIRPORT, Cleveland, Sept. 5—Major James H. Doolittle won the 100-mile Thompson Trophy race here this afternoon with an average speed of 252.686 m.p.h. for the $4,300 prize.

This morning Mrs. Mae Haizlip of St. Louis broke the world's land plane speed record for women with a speed of 255.513 m.p.h., surpassing Ruth Nichols' mark of last year by 44.877 m.p.h.

Major Doolittle made the hundred miles in 23 minutes 44.69 seconds, including the slow start from the ground.

He flew the Wasp-powered Geebee racer built by Granville Brothers, the same plane in which he set a world's speed record on Thursday.

James Wedell of Patterson, La., flying his Wasp-Wedell Williams, took second place in 24 minutes 44.56 seconds. Colonel Roscoe Turner of Los Angeles, in another Wedell Williams, took third. James Haizlip, husband of Mrs. Haizlip, flying his transcontinental record breaking plane, was in fourth place, and Lee Gehlbach, in another Geebee, took fifth place.

Belgium to Restrict Automobile Imports

BRUSSELS *(special)*—Belgium has now begun enforcement of import quotas on automobiles and parts based on the 1931 figures. It is believed probable that certain foreign countries have already exhausted their 1932 quotas.

Graham Ships More

DETROIT, Sept. 7—According to an announcement by C. W. Matheson, sales manager of Graham-Paige Motors Corp., shipping orders for the first 23 days of August were 62 per cent over those of the corresponding period in July this year. Shipments through August 23 were 35 per cent greater than those for the same period last year. Retail deliveries reported by distributors and dealers for the first three weeks of August exceeded the total deliveries for the entire month of July, 1932.

Pierce-Arrow Sales Up

BUFFALO, Sept. 7—Pierce-Arrow retail deliveries for the first 20 days of August show an increase of 54 per cent over the corresponding period in July, according to A. J. Chanter, first vice-president and general manager of the company.

June Gasoline Consumption Off 1.6%; Six Months' Total 3.9% Below 1931

The figures set out below, which are based upon the quantity of gasoline sold or offered for sale, as reported by wholesalers and dealers in the states listed, under provisions of the gasoline tax or inspection laws, reflect, as nearly as it has been possible to obtain it, the consumption of gasoline during June, 1932, with previous month and year ago comparisons.

While it is felt that the figures herewith are fairly comparable, it must be borne in mind that more or less widespread tax evasion and changes in the basic laws under which the figures were collected over the period compared may have disturbed the comparability of the figures. It is, therefore, not correct to base percentage changes in demand upon the figures presented herewith. All demand calculations used by the American Petroleum Institute are based upon Bureau of Mines' monthly statistics, which we regard as being more truly indicative of actual consumption. As we see the figures set out below, they represent a break-up, as nearly correct as it is possible to obtain it, by states, of the total demand in the United States, as calculated from Bureau of Mines monthly statistics.

GASOLINE CONSUMPTION BY STATES, JUNE, 1932

	*Tax Rate June Cents	Month of May, 1932 Gallons	Month of June, 1932 Gallons	Month of June, 1931 Gallons	6 Months Ending With June, 1932 Gallons	6 Months Ending With June, 1931 Gallons
Alabama	5	11,353	11,934	14,376	69,196	80,006
Arizona	5	5,970	6,596	6,898	35,928	37,597
Arkansas	6	7,292	10,125	9,183	53,791	59,491
California	3	113,958	152,103	135,171	701,687	725,517
Colorado	4	13,562	16,499	17,342	79,142	84,132
Connecticut	2	21,089	23,191	23,921	112,262	110,021
Delaware	3	3,486	2,842	3,361	17,471	17,257
District of Columbia	2	9,493	9,442	8,437	50,201	44,083
Florida	7	16,415	16,378	17,974	113,502	123,564
Georgia	6	15,943	16,674	19,144	99,376	106,091
Idaho	5	4,798	5,577	6,556	22,308	26,923
Illinois	3	76,984	89,352	93,223	454,840	467,297
Indiana	4	36,783	44,712	44,938	219,771	224,770
Iowa	3	29,630	39,406	38,336	177,597	198,232
Kansas	3	31,234	30,359	†35,664	153,667	164,017
Kentucky	5	13,910	14,874	15,851	77,062	81,025
Louisiana	5	13,362	14,351	16,577	81,877	89,239
Maine	4	10,310	11,711	12,351	44,577	44,434
Maryland	4	17,114	17,677	17,482	91,161	87,211
Massachusetts	3	50,175	54,050	54,534	258,644	255,395
Michigan	3	66,902	77,627	77,645	368,555	380,257
Minnesota	3	32,401	46,045	41,615	186,982	200,709
Mississippi	6§	‡8,049	‡8,541	9,991	‡49,337	55,184
Missouri	2	36,589	45,812	45,431	213,352	229,920
Montana	5	7,350	7,106	7,915	32,267	37,488
Nebraska	4	17,456	21,948	21,735	99,404	110,106
Nevada	4	1,961	2,329	2,686	10,761	10,636
New Hampshire	4	5,933	6,573	6,956	27,387	26,632
New Jersey	3	61,486	68,887	65,691	337,875	327,349
New Mexico	5	3,931	4,448	5,162	22,286	24,828
New York	3	142,795	153,114	152,703	743,432	728,171
North Carolina	6	18,883	19,110	18,776	116,763	117,760
North Dakota	3	10,048	10,746	10,529	47,612	55,275
Ohio	4	80,021	90,013	90,349	448,700	462,714
Oklahoma	4	20,807	26,869	28,643	133,537	145,828
Oregon	4	15,736	15,954	18,390	79,488	85,750
Pennsylvania	3	93,586	97,214	96,580	496,075	474,986
Rhode Island	2	8,402	10,124	9,405	46,868	44,164
South Carolina	6	8,840	8,710	10,498	51,179	58,069
South Dakota	4	10,214	11,303	13,534	53,208	68,292
Tennessee	7	15,422	15,323	20,378	90,363	101,189
Texas	4	63,185	69,561	77,273	363,919	394,154
Utah	4	4,980	6,369	6,283	26,820	29,168
Vermont	4	4,254	4,987	4,959	18,799	18,790
Virginia	5	20,003	21,767	22,282	109,929	109,134
Washington	5	23,677	24,351	26,233	121,164	126,983
West Virginia	4	11,432	12,053	13,580	58,989	61,588
Wisconsin	4	37,077	41,127	43,621	190,255	204,378
Wyoming	4	3,159	3,966	4,376	15,797	17,629
Total		1,337,440	1,519,830	1,544,538	7,475,163	7,733,433
Daily average		43,143	50,661	51,485	41,072	42,726
Change from previous year:						
Total decrease		.....	24,708	.....	258,270	.....
Percentage decrease in daily average		.....	1.60%	.....	3.87%	.....

* These are state tax rates per gallon. In addition there is the Federal tax of one cent (1c) per gallon.

† Estimated. ‡ Revised. § Became 6c on June 1, 1932.

Essex Is Bedecked In Opalescent Paint

DETROIT, Sept. 5—Opalescent paint, heretofore available only on custom-built cars at a large extra cost, is now standard equipment on the new Essex Terraplane automobile.

Four options of colors are available in the opalescent paint, the announcement stated—Black Opal, Emerald Green, Bright Blue and Evening Blue.

Gas Taxation Hurts Business

Allied Industries Suffer From Onerous Levies, Milan Ayres Says

CHICAGO, Sept. 8 — During hard times the piling of heavy gasoline taxes on the shoulders of John Motorist drives motor vehicles from the road, and deals heavy blows not only to the automotive industry but to all the allied lines, it was revealed today by Milan V. Ayres, analyst for the National Association of Finance Companies, who made public the results of a recent survey.

Mr. Ayres' figures show that the 6-cent gasoline tax has driven the registration of vehicles back below the 1927 level, while in states where the tax is only 2 cents registrations have continued on the increase.

"Each cent added to the gasoline tax has increased the effect of the depression insofar as the number of cars registered and in use is concerned," Mr. Ayres said in making public the results of his study.

"The only exception to this general trend is in the states of Florida and Tennessee, which both have a 7-cent tax. Combining the figures in these states, the registration of automobiles dropped from the 1926 level in 1927 and 1928 and jumped up in 1929.

"They have sagged steadily ever since. The last registration figures are still below the 1926 level.

"This can be explained by the collapse of the Florida land boom. The figures seem to indicate that Florida is about through with its own private depression, and considering the country as a whole, the Florida figures can be disregarded. As to the general effect of heavy gas taxes, here are the figures:

"In the five states charging 2 cents tax, registrations increased rapidly from 1926 to 1929 and moved up about 2 per cent in the next two years. In the eleven states with a 3-cent tax the curve is similar, except that there is a decided decrease in 1931.

"In the 17 states with a 4-cent tax the decrease is still more marked in 1931, and in eight states with a 5-cent tax, and Mississippi with its 5½-cent tax, there is a small decrease in 1930 and a marked drop in 1931. The four states which loaded on a 6-cent tax have brought their registration back below the 1927 mark. The change in registrations from 1929 to 1931 may be summarized as follows: 2-cent tax, increase of registration, 1.8 per cent; 3-cent tax, decrease 1 per cent; 4-cent tax, decrease 2.3 per cent; 5-cent tax, decrease 7.5 per cent; 6-cent tax, decrease 13.2 per cent. In view of these figures, unpleasant results for the automobile industry can be forecast from the additional Federal tax of 1 cent."

Electric Fuel Pump By Stewart-Warner

(Continued from page 337)

so that they move down as a unit, and in continued contact against the pressure of the three armature springs N and the plunger spring D under the influence of the pull between plunger A^6 and pole-piece A^7. This pull is augmented by the overhang of the armature, its outer edge largely absorbing and usefully directing what would otherwise be a stray field.

At the inner end of the stroke (view B, Fig. 4), armature E meets its in-stop, the leather washer L, and comes to rest, and the strong pull between the plunger A^6 and its pole-piece A^7, being much in excess of that between armature E and plunger A^6, causes the plunger to travel on a few thousandths of an inch, thus separating it from the armature, and opening the circuit. Armature springs N at once return the armature to its out position (view C, Fig. 4), away from plunger A^6 which later is also forced outward by its spring D upon cessation of the pull, following opening of the circuit.

Because of the relatively greater mass of plunger A^6, and the load it must overcome, its rate of return is less than that of armature E, and contact between them is reestablished only after the armature has come to rest at its out position. Thus the plunger is constrained to make full strokes of definite length with clean-cut making and breaking of the circuit at the outer and inner limits respectively.

The pump makes around 1200 complete strokes per minute when pumping at its maximum capacity.

Controllable Pitch Propeller In Production in Cleveland

CLEVELAND, Aug. 29—A controllable-pitch propeller invented by Dr. S. B. Smith is being manufactured by the Smith Engineering Co. in a plant at 1982 West 74th Street.

With such a propeller a plane can take off with heavier loads than with the standard propeller, and when the plane is once in the air the pitch can be set for speed. The propeller is claimed to enable the pilot to take off with a shorter run and to climb safely at a steeper angle.

Incorporated in the hub of the propeller is a train of worms and worm gears giving a reduction ratio of 23,760 to 1. The regular thrust-bearing cover plate of the engine is removed and a similar thrust-bearing cover plate is installed, into which the pitch-changing mechanism is fitted. The mechanism is operated by means of a push-pull control which runs from the thrust-bearing cover plate to the cockpit. Thus the pilot can change the pitch of the blades from the cockpit.

Propellers are made up in 20, 30, and 40 spline types, with blade diameters running from 8 to 10 ft., inclusive. Blades are made of S.A.E. No. 6130 chrome-vanadium steel. It is claimed for this material that it makes it unnecessary to take the propellers out of service for etching or for refinishing the blade edges, and that the blades are more resistant than others to pitting and corrosion, and to the effects of sand, gravel, rain, hail, salt water and sudden changes in temperature. The propeller hub also is made of chrome-vanadium steel and the assembled propeller is said to be exceptionally smooth-running and free from vibration.

S. A. E. Councillor

Walter C. Keys, consulting engineer, Detroit, has been elected to the council of the Society of Automotive Engineers to fill

Walter C. Keys

out the unexpired term of the late Fred S. Duesenberg.

Mr. Keys served successively as chassis engineer of Cadillac Motor Car Co., executive engineer of Standard Parts Co., sales engineer of Gabriel Snubber Co., and chief engineer of the automotive development department, United States Rubber Co.

Graham Orders Show Big Gain

DETROIT, Sept. 6—Robert C. Graham, executive vice-president of Graham-Paige Motors Corp., in a statement on the company's August sales, says that orders received at the factory for sixes and eights during August were 67 per cent ahead of July and exceeded the corresponding month a year ago by 47 per cent.

Retail deliveries for the first three weeks of August were greater than for all of July.

Scheduled production for the first two weeks of September is equal to the entire output originally planned for the whole month.

Australia Cuts Duties On Automotive Parts

New Government Keeps Pledge to Comply With Ottawa Parley Program

WASHINGTON, Sept. 8—Australia has effected sweeping changes in its tariff policy and among other things has reduced duties on piston rings, pins and valves for internal combustion engines.

The most noteworthy alteration in the Australian policy was to lift the remaining import prohibitions, accordto a radiogram received by the Department of Commerce.

These prohibitions, which covered automobile bodies, parts, etc., had been temporarily imposed as part of an emergency measure since April 4, 1930. The amounts of reduced duties vary but were not specified in the report.

The loosening of its tariff policy is said to reflect improvement in Australian exchange, to be in line with a pledge made by the new government which came into power a year ago and to fulfill a promise made at the British Imperial conference in Ottawa.

Coincident with the Australian action, Great Britian, through the Board of Trade, announced numerous tariff increases. They are applicable only in small degree to American imports and do not cover items of interest to the automotive industry. The higher duty will affect Germany, Italy and France chiefly.

F.W.D. to Build Trucks in Canada

KITCHENER, ONT., Sept. 6—Tariff changes and Imperial Conference regulations regarding use of empire materials in motor trucks have caused the Four-Wheel Drive Co. to start assembling and rebuilding trucks at its plant here, previously used only for repair work.

The factory will have additional machinery installed within a few weeks.

Udylite Granted Patent On Ball Anode Container

DETROIT, Sept. 6—United States Patent No. 1,868,052 covering the cadmium ball anode helical coil container has just been granted to the Udylite Process Co. The basket or container comprises a wire helix. The convolutions are fairly widely spaced at the top of the basket but they approach together at the bottom of the basket so as to coordinate the cage with smaller size balls.

Thompson Reports Profit

DETROIT, Sept. 6—Thompson Aeronautical, including Trans-American Airlines, for the fiscal year ended June 30, has reported a net profit of $12,-119 after depreciation and taxes.

Automotive Advertising Shows Decline in August Magazines

Broadcasting on National Networks Shows 53.5 Per Cent Gain for July

NEW YORK, Sept. 6—Expenditures by the automotive industry for advertising in national magazines and farm magazines during August showed a recession of 49.1 per cent from the same month last year.

The total was $716,630, as compared to $1,410,967 a year ago. National magazines accounted for $668,180, off 48.6 per cent, and farm magazines accounted for $48,450, off 56.2 per cent.

Of the total in national magazines, $326,212 was spent for passenger cars and trucks, $225,068 for tires and tubes, and $116,900 for accessories, according to figures compiled from National Advertising Records by the business survey department of Dorrance, Sullivan & Co.

The August drop was considerably greater than the average recession for the first eight months of the year. During this period the expenditure was $10,395,436, a decline of 22.4 per cent as compared with the corresponding period of 1931.

National magazines were behind 20.3 per cent with $9,729,040, and farm magazines were behind 44.0 per cent with $666,396.

Radio advertising over national networks again showed an increase in July, although the gain was not as great as that for the year to date as measured by percentages.

The July total was $136,889, a gain of 53.5 per cent over $89,145 spent in July 1931, while for the first seven months of the year the total was $1,499,995, a gain of 99.8 per cent over $750,887 spent during the corresponding months last year.

Dr. Gough to Speak on Corrosion Fatigue

LONDON *(Special)*—The first of a series of gatherings in connection with the forthcoming joint Autumn Meeting of the Iron & Steel Institute and the Institute of Metals will be held at the Institution of Mechanical Engineers, Storey's Gate, Westminster, S.W.L., at 8 p.m. on Monday, Sept. 12, when Dr. H. J. Gough M.B.E., superintendent, engineering department, National Physical Laboratory, will deliver the annual autumn lecture of the Institute of Metals on "Corrosion Fatigue in Metals." The paper will deal with both steel and non-ferrous metals.

Meco, Inc., Organized

MILWAUKEE, Sept. 1—Five former members of the engineering staff of the A. O. Smith Corp. have organized Meco, Inc., and established a plant for the production of metal goods, development of inventions, general engineering and manufacturing service, etc. Officers of the new concern are W. E. Richter, John Dilot, Gilbert E. White, Runo A. Lee and Walter Hartje.

De la Valette

Count de la Valette, one of the pioneers of the French automobile industry, recently died in Paris at the age of 70. He was educated as a mining engineer and founded the industrial electrical laboratory at the Arts and Trades Conservatory in Paris. Later he acquired the French rights to the Eisemann high-tension magneto and started its manufacture in France. This was the beginning of what is now the most important establishment in the automotive electrical equipment industry in France. De la Valette at one time acted as technical secretary of the Automobile Club of France, was a member of the governing board of that club, and also took an active part in the development of aviation in France.

Hudson - Essex Sales Show Increase, Report

DETROIT, MICH., Sept. 5—Despite a general seasonable decline in automobile sales throughout the country, Hudson and Essex sales for the first three weeks in August increased 2000 units, or approximately 300 per cent over a similar period during July, according to announcement today by Chester G. Abbott, general sales manager for the Hudson Motor Car Co.

These figures also represent a 17 per cent increase over the corresponding period of last year, Mr. Abbott stated.

Federal Screw Reports Loss

DETROIT, Sept. 6—Federal Screw Works and subsidiaries has reported net loss of $238,760, after depreciation and interest, for six months ended June 30, compared with net loss of $65,712 in the corresponding period of 1931.

Carl H. S. Fischer

Carl H. S. Fischer, 47, general factory superintendent of Ternstedt Mfg. Co., died in Detroit Thursday after a brief illness.

After his graduation from the engineering school of University of Michigan, and association with the automobile industry in Detroit, he joined Fisher Body Corp., becoming an executive of Ternstedt when it was formed as a subsidiary of Fisher Body.

Chevrolet August Sales Will Exceed July Total

Knudsen Says U. S. Tax Felt Most in July; Sees Restoration of Confidence

DETROIT, Sept. 6—On the basis of dealer reports of Chevrolet sales for the first 20 days of August, normally the dullest of the summer season, last month promises to exceed July by a comfortable margin, W. S. Knudsen, president and general manager of the Chevrolet Motor Co., announced.

Up to Aug. 20, sales for the month were reported as 17,038 units compared with 14,698 in the same days of July, a gain of nearly sixteen per cent. For the past several years, July sales have consistently run ahead of the August total, Mr. Knudsen said.

He pointed out that the new Federal tax on automobiles was felt hardest in July, so that that month was subnormal in relation to other months of this year; but he stated that he did not believe the tax accounted for the full amount of the gain made to Aug. 20 over July.

He attributed a share of the increase to a substantially improved sentiment country-wide, and a gradual rebuilding of confidence, with the result that people able and intending to buy a new car, but who have been postponing the purchase through fear of the future, are now entering the active buying lists.

Graham-Paige Reports Gains

DETROIT, Sept. 5—Reflecting a real improvement in business, the Graham-Paige Motors Corp. the first 23 days of August showed a 62 per cent gain over those of the corresponding period in July, this year.

Retail deliveries reported by distributors and dealers for the first three weeks of August exceeded the total deliveries for the entire month of July, 1932.

Plymouth June Sales Show Big Increase

DETROIT, MICH., Sept. 5—Complete June new car registrations for all states except Georgia show that Plymouth registered 429.5 per cent as many cars as it did in June a year ago, according to H. G. Moock, general sales manager.

For the year to date, Plymouth was the only company in the automobile industry to register more cars than during the first half of 1931, its registrations being 318.4 per cent.

Jacobsen to Build Engines

RACINE, WIS., Aug. 29—The Jacobsen Mfg. Co. has taken over the manufacture of engines from the Johnson Outboard Motor Co., Waukegan, Ill. Considerable equipment is being transferred to Racine.

Oct. 6. Set for Pact Approval

Ottawa Conference Agreements Up to Canadian Parliament

OTTAWA, Sept. 6—The automotive industry will know the best—or the worst—on or after Oct. 6, when the Canadian Parliament will convene for the purpose of passing upon pledges made by its delegates at the Imperial Economic Conference.* More or less simultaneously, the Imperial Parliament in London will proceed with the other part of the Conference "bargain," as it affects the automotive and other industries of Canada and the United Kingdom.

Canadian tariff changes will be known only when Hon. E. N. Rhodes, federal minister of finance, tables his budget resolutions in the Canadian House, at which moment the revisions will become operative.

Someone has suggested that a "wailing wall" should be set up in Ottawa for the manufacturers of Canada because of the expectation that all will not be well for the Canadian trade when Rhodes rides in with his revisions. No one will know what is in the bag until the budget speech is delivered.

This session will be regarded as the first sitting of the 1932 Parliament and, after urgent Conference business has been dealt with, the session will adjourn in two or three weeks to resume functioning next February for so-called ordinary measures.

The air is bristling with possibilities for the automotive industry of Canada and it is probable that the trade will be fully represented at Ottawa during the Parliamentary session in October.

*"Free Trade Granted to Dominions," page 255, Aug. 27, 1932, *Automotive Industries.*

1931 World Motorcycle Production Down 33%; U. S. Remains Fourth

WASHINGTON, Sept. 5—In 1931, according to estimates from the producing countries, world production of motorcycles totaled 235,977 units, a decrease of 115,552 units, or 32.8 per cent, as compared with the 1930 output, according to the Department of Commerce.

The increased popularity of the "baby" car abroad and the low price of used passenger cars have militated against the sale of motorcycles, though the decline is attributable in part also to adverse economic conditions in all countries. Only three countries showed an increase in the output of motorcycles, and they were the less important producing countries —Japan, Hungary, and Czechoslovakia.

The United Kingdom was the leading producer, though its output was 36.3 per cent less than in 1930. France retained second position with a decreased output of only 6.7 per cent, and Germany was third with a decrease of 39.7 per cent.

As in 1930, the United States ranked fourth as a producing country, its decline in production comparing with the decrease in other countries.

Exports of all countries, with the exception of Switzerland and Italy, decreased as compared with 1930. Shipments from the United States represented 36 per cent of production, compared with 44 per cent in 1930; the number of units exported was 46 per cent less than in 1930.

The United Kingdom was the largest exporter of motorcycles, in spite of a decrease of 45 per cent in the number shipped. Exports from Germany, which held second position, decreased only 6 per cent. The total number exported from all producing countries dropped over 42 per cent.

Exports of motorcycles and parts from the United States during 1931 were valued at $1,869,055, or 44 per cent less than the 1930 valuation of $3,365,567. Of these totals, $566,629 represented the exports of motorcycle parts and accessories in 1931, and $955,155 those in 1930.

Japan, which replaced Canada as the leading market for American motorcycles, was the only one of the 16 leading markets to show an increase (49 units) in imports.

Canada's purchases of American motorcycles numbered 59.9 per cent less than in 1930 and dropped that country to second position. Sweden and the Netherlands took third and fourth positions, in the order named.

Germany, which was the second largest purchaser in 1930, decreased its takings in 1931 by 60 per cent and dropped to sixth place.

World Production and Export of Motorcycles, by Countries, during 1931, with per cent of Exports to Production

Producing country	Production 1930	Production 1931	Export 1930	Export 1931	Per cent of production increase (+) or decrease (—)	Per cent of export to production
Austria	7,000	3,500	3,082	865	—50	24.7
Belgium	13,000	10,300	6,444	2,902	—20.8	28.2
Czechoslovakia	*1,500	1,900	24	17	+26.7	.9
France	*75,000	70,000	5,702	3,662	—6.7	5
Germany	68,000	41,000	7,554	7,085	—39.7	17.3
Hungary	177	228	.....	.....	+28.8	...
Italy	11,500	11,030	222	221	—4	2
Japan	2,625	7,600	.....	.....	+189.5	...
Sweden	5,320	2,000	.....	.....	—62.4	...
Switzerland	*5,040	4,000	690	745	—20.6	18.6
United Kingdom	119,607	76,228	42,631	23,247	—36.3	30.5
United States	23,500	15,191	10,262	5,469	—35.4	36
Total	*352,269	242,977	76,611	44,213	—31.0	18.2

*Revised figures.

Hugo Bilgram

Hugo Bilgram, inventor of the Bilgram bevel gear-cutting machine and founder and president of the Bilgram Gear & Machine Works, Inc., Philadelphia, died at his home in Moylan, Delaware County, Pa., on Aug. 27, in his 86th year. Mr. Bilgram designed and built the first bevel-gear generating machine, which played an important part in the development of the automobile industry. It was on a modified Bilgram bevel machine that the first spiral bevel gears employed for the final drive of passenger cars were cut. Bilgram also developed a chainless bicycle and was responsible for a number of developments in the gear-cutting art aside from his bevel-gear generator. He was author of several treatises on economic subjects, among them "Involuntary Idleness," published in 1889; "The Cause of Business Depressions," 1914, and "The Remedy for Overproduction and Unemployment," 1928.

At the time of his death Hugo Bilgram was the oldest member of the Franklin Society of Philadelphia, to which he had belonged for nearly 60 years. He also was a founder of Technischer Verein, a Philadelphia German club; a member of the Academy of Natural Sciences, the American Academy of Political and Social Science, the American Society of Mechanical Engineers and various other organizations.

Born in Memmingen, Bavaria, Mr. Bilgram was graduated from the School of Mechanical Engineering at Augsburg in 1865, and after working as a draftsman came to Philadelphia four years later.

Offers Stock For Pay Cut

MILWAUKEE, Aug. 29—An innovation in salary reductions is planned by the Allen-Bradley Co., manufacturing automotive specialties, etc.

Application for the issuance of $37,500 additional preferred stock has been made to the State Securities Board. This is planned to be offered employees to compensate them for a horizontal reduction in salaries for one year, the stock to be redeemed at par as soon as business conditions warrant. The employees have approved the plan. The Securities Board is expected to give its decision shortly.

M.E.M.A. & N.S.P.A. Show Dec. 5-10

Joint Exhibition Will Have Big Entry List, Reports Indicate

The coming Third Joint Trade Show of the Motor & Equipment Mfrs. Association and the National Standard Parts Association, to be held in the Detroit Convention Hall Dec. 5 to 10, inclusive, has stepped into the limelight as an event of major importance this year for the parts, accessories, and equipment industry.

A. B. Coffman, joint show manager, has reported that interest is running unusually high on the part of manufacturers planning to exhibit as well as on the part of wholesalers planning to attend.

To date more than 100 manufacturers have applied and paid for space requiring over 300 booths. Executive bodies of both sponsoring associations, the M.E.M.A. and the N.S.P.A., have reaffirmed their belief that the show will play a leading part in stimulating trade.

Invitations already have been mailed to a selected list of 1500 overseas distributors of automotive products and as soon as the Credentials Committee has completed its work, invitations will be sent to a list of approximately 3000 jobbers in the United States and Canada who are members of none of the participating organizations.

Canadian Production 7472, 5% Increase

OTTAWA, Sept. 6 — Production of 7472 automobiles in Canada during July showed a gain of 5 per cent over the 7112 cars made in the previous month, and exceeded by 77 per cent the 4220 cars made in July a year ago.

The increase over June was wholly accounted for by the continued improvement of foreign markets, as the number of cars made for export advanced to 2699 from 1233. This gain was sufficient to more than offset the decline from the previous month of 1106 in the number of cars made for sale in Canada. Compared by types of cars the July figures show that passenger cars advanced to 6773 from 6308, while the production of trucks was lower at 699 as against 804 in June.

Customs records for July show that 114 cars were imported into Canada and 1540 exported during the same period. On only three occasions in recent years have the monthly import figures been lower, while the export figures were the highest reported for any month since May, 1931.

Of the July output 4773 cars were made for sale in Canada, leaving a balance of 2699 cars intended for export.

The apparent consumption of automobiles in Canada during the month, as determined by adding the 4773 cars made for sale in Canada to the 114 cars imported, amounted to 4887 cars.

For the year to date the apparent consumption totaled 42,939 cars, and during the first seven months of 1931 to 68,350 cars.

Estberg to Act as Waukesha Official

WAUKESHA, WIS., Sept. 6—Edward R. Estberg, president of the Waukesha National Bank, and vice-president of the Waukesha Motor Co., has been made acting secretary-treasurer of the motor company, succeeding the late Samper A. Perkins, until the annual meeting Oct. 18, it is announced by President H. L. Horning.

The report for the year ended July 31 will be made public at the annual meeting. Currently, business is somewhat slow, this usually being the low period of the company's year, but a pick-up is expected in a month or so, Mr. Horning said.

German Air Exhibit Oct. 1-23 at Berlin

BERLIN *(Special)*—The German Air Sport Exhibition will be held at Berlin Oct. 1-23, 1932, under the auspices of the German Aeronautics Association. The exposition will be made up of exhibits representing the history of aeronautics, construction of model aircraft, flying and gliding instruction, products of the industry and home-made aircraft.

India Tire Prices Up

New List Schedule of 11 to 15% Increases Effective Sept. 3

AKRON, Sept. 2—India Tire & Rubber Co. announced that, beginning September 3, all prices on tires and tubes would be increased from 11 to 15 per cent to offset the Federal excise tax.

This concern is the second to adopt the policy, following the lead of the Pennsylvania Rubber Co., in returning to the raise projected last June. At that time the increased prices were balanced by a policy of additional discounts and reductions when mail order houses and one large manufacturer declined to join in the increase.

President G. W. Klauss, of India, declared that the price increase is the only feasible remedy for tire industry conditions.

"Otherwise," he said, "it is apparent that to stay in business one must either cut wages or reduce the quality of the product. India does not propose to do either, and we're going to stay in business," he said in a statement.

In making the announcement of the adoption of the June 21 price level, Klauss said that the company pledged its dealers continuation of present sales policies, which permit distribution only through established independent dealers.

+ + CALENDAR OF COMING EVENTS + +

FOREIGN SHOWS

London, Olympia Show .....Oct. 13-22
Glasgow, Scottish Motor Show..Nov. 11-19
Paris, Aeronautical Show ..Nov. 18-Dec. 4

CONVENTIONS

American Society Mechanical Engineers, Cleveland, Ohio (Machine shop practice meeting) .....Sept. 12-17
American Trade Association Executives, Atlantic City (Annual) .....Sept. 15-17
Penna. Automotive Assn., Harrisburg, Pa. .....Sept. 19-20
Natl. Assoc. of Motor Bus Operators, Chicago .....Sept. 29-30
American Electric Railway Assn., Chicago, Ill. .....Sept. 27-28
Amer. Institute Mining & Met. Engrs. (Petroleum Division), Dallas, Texas .....Sept. 30-Oct. 1
National Metals Congress, Buffalo .....Oct. 3-8
S.A.E. Production Meeting, Buffalo .....Oct. 3
Amer. Society for Steel Treating, Buffalo .....October 3
Amer. Institute Mining & Met. Engrs. (Iron & Steel Division) Buffalo, N. Y. .....Oct. 3-6
National Safety Council, Washington, D. C. .....Oct. 3-7
American Welding Society, Buffalo, N. Y. .....Oct. 3-7
American Society Mechanical Engineers, Buffalo, N. Y. (Natl. Iron and Steel Meeting) .....Oct. 3
S. A. E. Annual Transportation Meeting, Toronto .....Oct. 4-6
American Gas Association, Atlantic City (Annual) .....Oct. 10-14
Natl. Hardware Assn. (Accessories Branch), Atlantic City, N. J. .....Oct. 17-22
Natl. Tire Dealers Assoc., Atlanta, Ga. .....Nov. 14-16
American Society Mechanical Engineers, New York City (Annual Meeting) .....Dec. 5-9
Natl. Exposition of Power & Mechanical Engineering, New York .....Dec. 5-10
Highway & Building Congress, Detroit .....Jan. 16-23

These Facts
CHALLENGE
Your Serious Consideration

In the first four months of 1932:

Car manufacturers using Burgess Mufflers and Intake Silencers as original equipment sold 89.41% of their 1931 car volume, whereas

Competitors sold only 44.5%.

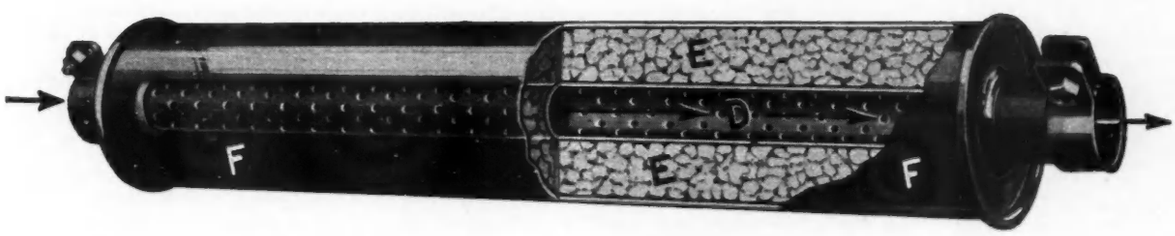
Later incomplete records indicate relatively the same percentage.

Give People What They Want:

We realize that the outstanding sales record this year of Burgess-Equipped cars is not due entirely to our equipment. We put forth the thought, for consideration, that possibly those manufacturers . . . using Burgess Mufflers and Intake Silencers . . . are smarter engineers and merchandisers in knowing what the public demands and in giving it to them:

Quieter Operation—Greater Power—Faster Getaway

The manufacturers, using Burgess equipment, improved their position in the industry by over 12% of all cars sold. These facts merit and demand immediate consideration from you as to how Burgess Mufflers and Intake Silencers can help you sell more cars.



AS illustrated above, the Burgess Muffler consists of three principal parts: a straight open perforated pipe, D, surrounded by a sound-absorbing material, E, which is enclosed in a metal covering, F. The exhaust gases from the engine pass straight through the perforated pipe, D, but the exhaust noises are absorbed, assuring satisfactory muffling.

BURGESS
BATTERY COMPANY
ACOUSTIC DIVISION, MADISON, WISCONSIN
DETROIT ADDRESS: 542 NEW CENTER BUILDING
ENGINEERS AND MANUFACTURERS OF ELECTRIC AND ACOUSTIC PRODUCTS

Gar Wood Retains Harmsworth Trophy

(Continued from page 327)

to ease off the speed of one propeller while using the other to hurl the boat around the bend. By this means it is said the new craft will be able to take a reasonable turn at 100 miles an hour. It was while rounding a turn last year at Detroit that Don overturned and narrowly escaped death. With the step an integral part of the new boat, the accident in which Sir Henry Segrave met death in Miss England II when the boat struck a floating object on Lake Windermere, England, is out of the question. The step on Miss England II was merely bolted on, breaking when it struck the floating object.

Every grain in the woodwork of the $195,000 wonder boat which Lord Wakefield entered at Detroit last week was subjected to microscopical examination. The cross members are of Honduras mahogany and the frame of Canadian rock elm. The stern is squat and flat and the bow tapers to the figurative thinness of a razor blade. To eliminate as much resistance as possible a special paint finish was used and on top of this is a coating of graphite, forming a layer of lubricant between the boat and the water.

The development of the Packard "2500" engine started in 1923.

A long series of tests and research proved that rigidity of main bearings was more important than their length. These tests determined that a short, rigid bearing was more effective than a long bearing of less rigidity, such as a bronze back bearing. This research work resulted in today's steel back bearing. It made possible shortening the length of the bearings in our aircraft motors to the point where it was feasible to locate the cylinders only ⅛ in. apart.

This resulted in materially shortening the over-all length of the engines thus reducing total weight and making possible the present-day high power output and low weight water-cooled aircraft engine. It was the background of all present-day water-cooled aircraft motors.

The valve housing, the through main bearing studs and the elimination of gaskets between the valve housings and cylinders were important refinements of the original design.

The engine started at 770 hp. at 2000 r.p.m. and has been carried up until now Gar Wood's engines develop 1600 hp. This gain has been made practically without any structural changes in the motor.

The four engines Wood uses were delivered to him the summer of 1928 and at their delivery produced 1000 hp. each. Higher engine speeds and supercharging has increased this power output to 1600 at 2600 r.p.m. The original Packard "2500" engine and its smaller brother, the "1500," were the lightest engines for their power anywhere in the world at the time they were introduced. The Wood engines remain the most powerful motors of this type in the United States. They exceed the power of any other such engines produced in this country by more than 100 per cent.

• The bore of the engines is 6⅜ in. and stroke 6½ in. Exhaust valves are cooled by oil circulating through them. All four engines have been equipped with Roots type superchargers by Schweitzer Cummins Co. of Indianapolis, producing approximately seven pound pressure. Each engine has four duplex downdraft Holley carburetors. There is an interesting feature in these. The float level is above the jets, the control of fuel being maintained by manual operation.

In the two aft engines which are at a lower level than the forward motors, constant level is maintained in the carburetor bowls through the use of geared pumps on drain lines which carry any overflow due to pitching of the boat back to the gas tanks. Drains for the forward carburetors are by gravity to the tanks. Each engine has its own gas tank with a capacity of seventy-five gallons.

All four engines, when all are wide open, consume 480 gallons of gasoline an hour. The superchargers operate at twice engine speed. There are spring loaded safety valves in the inlet manifolds to prevent damage in the superchargers in the event of backfiring.

The engines are mounted tandem, driving into a common gear box located between them. Timing of the pairs of engines is staggered thirty degrees through rotating the crankshaft in relation to each other.

Two oil tanks with integral built-in coolers are used, one for each pair of engines. Cooling water is obtained through scoops on the outside of the boat and the tanks are vented into the engine.

The gear boxes designed by Gar Wood are of considerable interest. There is a 15 in. large gear carrying the spline into which the ends of both engines fit. This drives a pinion on the end of the comparatively short propeller driveshaft. The gear teeth are slightly bevelled to take care of the slight angle of the pinion. They are practically spur gears. The large gear runs on two ball bearings and the small gear runs on two roller bearings on the shaft with a ball thrust bearing.

It will be interesting to know that the thrust from each propeller shaft totals nine thousand pounds, giving a total of eighteen thousand pounds for both. The gear boxes have a wet sump. The gears themselves act as an oil pump to keep the oil continuously circulating through the gear box. The box is vented into a tank located on the top.

The four Packard engines in Miss America X have a remarkable history among all aircraft motors. The two after engines were installed in the Miss America VI in August, 1928. On her second trial trip the hull of this boat split wide open when it struck an obstruction or a wave in the St. Clair River. The motors went down in 30 ft. of water and were buried in the mud at the bottom for ten days. There was time only to clean them of mud and silt before putting them into a new boat, Miss America VII, for the 1928 Harmsworth Race.

They functioned perfectly, won the race and later in the year at Miami, established a new world's record of 93.123 miles an hour.

The same engines the following year in Miss America VII, went to the bottom again, this time in salt water, in the bay at the Lido when the boat struck a floating object and went to pieces. After several days' immersion they were rescued and were still unharmed. This was in 1929 following the winning of the Harmsworth Race by Miss America VIII, which had the other two engines now in Miss America X.

Miss America VII was runner-up in this race. The original Miss America VI engines went into the Miss America IX and were the first to carry a man more than 100 miles an hour in a boat. They later hung up another world's record of 111.712 miles an hour.

Miss America X was designed by J. Napoleon Lissee for Wood and is 38 ft. long with 10½-ft. beam, powered with four Packard V-12 engines mounted tandem and connected to the propeller shafts by a gear between the engines. They are supercharged and rated at 1600 hp. at 2700 r.p.m.

This is one of the largest hydros ever built. She is three feet longer than Miss England III and 10 ft. longer than Miss America IX. She is not as long as the Dixie, which won the British International Trophy at Southampton in 1907, as that displacement boat was 39 ft. 11 in. long but had only 5-ft. beam.

Tabulation of World's Records

1923	Gar Wood	Miss America II—2 Liberty Engines, 415 hp. each—80.567.
1928	Gar Wood	Miss America VII—2 Packard Engines, 1060 hp. each—92.8.
1929	Gar Wood	Miss America VII—93.123.
1930	Maj. H. O. D. Segrave	Miss England II—2 Rolls-Royce, 2050 hp. each—98.76.
1931	Gar Wood	Miss America IX—2 Packard Engines, 1060 hp. each—100.6.
1931	Gar Wood	Miss America IX—101.154.
1931	Gar Wood	Miss America IX—102.256.
1931	Gar Wood	Miss America IX—103.065.
1931	Kaye Don	Miss England II—103.49.
1931	Kaye Don	Miss England II—110.223.
1932	Gar Wood	Miss America IX—110.785 (not allowed because not ½ of a nautical mile faster than previous record).
1932	Gar Wood	Miss America IX—111.712 (not yet recognized by International Motor Yachting Union).
1932	Kaye Don	Miss England III—119.81.